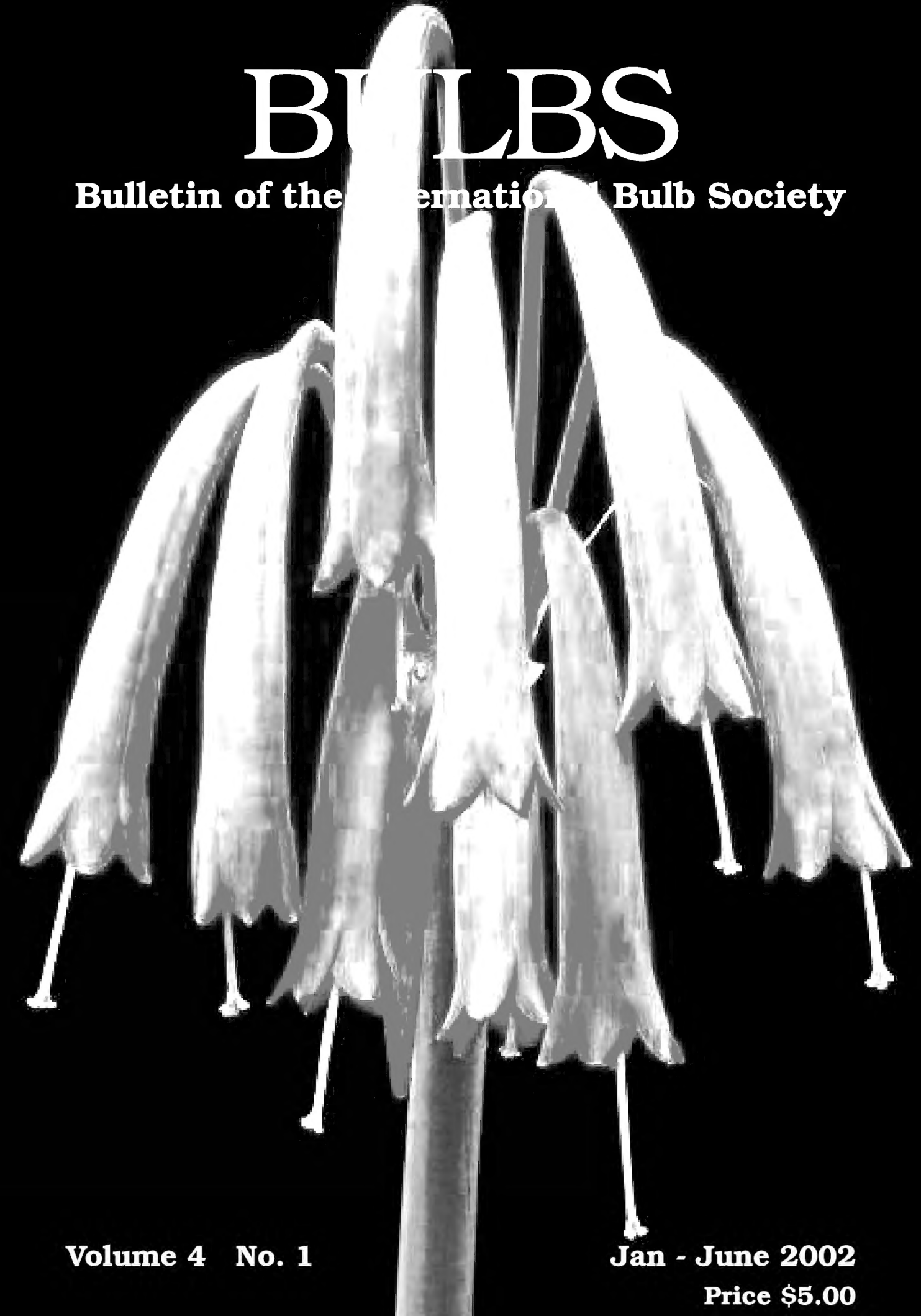


BULBS

A black and white photograph of a bulbous plant, possibly a species of Allium. The plant features a central, upright stem and several long, slender, drooping leaves that hang down from the top. The leaves have a slightly ruffled or scalloped edge. The background is dark, making the light-colored plant stand out.

Bulletin of the International Bulb Society

Volume 4 No. 1

Jan - June 2002

Price \$5.00

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Bulbs

The Bulletin of the International Bulb Society

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Do you have comments? We want to hear from you! Send comments to: BULBS - Editor, PO Box 92136, Pasadena, CA, 91109-2136, USA. Email to: Editor@bulbsociety.org

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Join the International Bulb Society! Member benefits: annual *Herbertia*, semi-annual *BULBS*, semi-annual Seed Exchange (SX), educational website, email Bulb Forum, and the Bulb Exchange (BX) (for members of the email Bulb Forum).

1 Year US	\$40.00
1 Year International (air mail: <i>Herbertia</i> ONLY))	\$45.00
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BULBS

Volume 4, Number 1

January/June 2002

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COVER PHOTO
Cyrtanthus tuckii var. *viridilobus* by Bill Dijk

First Words

Tony Palmer - Editor

I've been a member of the IBS since 1997. What an experience. So much learnt from your collective wisdom and knowledge. So many friends made around the world, most of whom I've never met, but yet feel I know so well. Some I have met in person and it has always been a most pleasant experience. My wife and I would love to travel and meet more of you and of course any of you who choose to visit New Zealand can be assured of a warm welcome. Unfortunately a fairy godmother will be required to pay the air fares!

That's one of the disadvantages, of course, of living so far away from the rest of the globe, but we mustn't complain as we are blessed with a climate that varies so much from one end of the country to the other, that we can grow almost any bulb somewhere. In that regard one of the other great benefits of IBS membership is, of course, the exchange of seed and plants. As a result I have acquired seed of species that I might otherwise never have had the excitement of growing. A couple of other long standing New Zealand members who have contributed to, and benefited from these exchanges, are Bill and Willy Dijk. I hope you will enjoy the article I have written about them and their nursery, Daffodil Acre.

Then there are the joys of the online forum and images list. Mary Sue Ittner is a master at distilling from her amazing archives the essence of a subject that has been discussed. I am so pleased to have her writing again, this time about getting bulbs in sync when they are sent between hemispheres.

To add to the New Zealand flavour of this issue we have a comprehensive article on *Clivias* by our own Dr Keith Hammett. Long promised, finally delivered, and well worth waiting for. Indeed, if it had been written earlier we would not have had the 'scoop' of being able to include a newly described species, *C. mirabilis*.

To coincide with the publication of his new book *Grow Nerines*, Graham Duncan has written an authoritative article on *Nerines* and Lisa Flaum includes a review of his book in her column.

From South Africa, Rhoda McMaster has contributed an interesting article on Stutterheim's *Grandiflora Moraeas* and she has more fascinating topics in the pipeline.

Robert Turley, Rachel Saunders, Bill Richardson, and I have compiled some World News items. I would like contributions from as many countries as possible for this feature in future issues.

The last but not least major benefit of being an IBS member is access to the Societies Publications *Herbertia* and *Bulbs*. Not much benefit if you hardly ever get them though. I pledge to do my utmost to see that *Bulbs* will in future be received by you twice yearly and on time. To achieve this I need plenty of copy. So far your response has been great and I already have enough for the next issue. Thanks.

Email Tony at: adpal@ihug.co.nz

NEW PROCEDURES FOR DONATING TO THE SEED EXCHANGE AND BX

From now on, non-US donors please send donations to:

Gerrit Oskam
Plantsoensteeg 6
3961 CB Wijk bij Duurstede
The Netherlands

Gerrit will then obtain a phytosanitary certificate for them and send them on to the United States. Please post in mailing envelopes only, not boxes. Please do not send anything other than clean SEED, no bulbs etc. Donors from the US should continue to send donations of seed or bulbs to:

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World News, Views and Events

From America . . .

The Magic of Bulbs

Robert M. Turley

Lake Charles, Louisiana USA

It is hard to believe how the seasons have moved forward so fast that summer is already here. I was just enjoying the daffodils and tulips in containers on the patio, it seems yesterday, and now it is the end of May with crinums and rainlilies in full bloom. I have one of the most beautiful sights in my garden this year: three years ago I planted three large bulbs of *Crinum x herbertii* 'Carroll Abbott.' Now the three bulbs have grown into clumps forming one large clump, which is in bloom with 22 magnificent stalks of white and burgundy striped flowers. Repeating scapes make for a long season of bloom. The fragrance is marvelous!

Another bulb that is really making a show in the garden is *Habranthus robustus*. The bulbs have increased and with their prolific seed setting habit, I have planted it in the garden in different places. This precious little bulb is really making a show. To this I can add *Zephyranthes macrosiphon*. The pink color is brighter and the flowers are larger when these bulbs are grown in outdoor pots and in the garden, than when they are grown in the greenhouse. This is another one that increases well both in bulbs and seeds. I will use this bulb a lot more, too.



Habranthus robustus. Tony Palmer

May and early June is *Hemerocallis* season along the Gulf Coast States. This particular geophyte has always been a perennial favorite and many beds are devoted to its culture. The garden is ablaze with *Hemerocallis*.

"The Magic of Bulbs" was the theme of the IBS Symposium, held in the Huntington Botanical Garden, San Marino, California, April 27 & 28, 2002. Those in attendance were well pleased with the program. Fascinating bulbous topics with great presenters, and a wonderful bulb auction providing plenty of bulbs for everyone to take home and enjoy.

To our hosts Michael Vassar and Jim Folsom at the Huntington Botanical Garden: thank you for being so gracious and what a wonderful place to have a Bulb Symposium. The IBS Bulb Symposium 2002 was the work of Herb Kelly, Jr. of Sanger, California. Herb Kelly is to be commended for the fine job he did in making the Symposium a reality!

The Symposium began with a presentation on those rare and elusive blue Amaryllids by noted author and IBS editor, Dr. Alan Meerow, from the USDA-ARS-SHRS in Miami, Florida, entitled "I'm So Lonely I'm Blue: Brazil's Endangered Blue Amaryllis".

Charles Hardman, noted southern California *Hippeastrum* grower and immediate past President of IBS, provided us with an informative presentation on "Hippeastrum, Early Hybrids & Species".

Crinum enthusiast and breeder, Dave Lehmiller of Beaumont, Texas updated us on "New Developments in Crinum Hybrids".

Michael Vassar, Director of Floristic Gardens, Huntington Botanical Garden, gave a fascinating look at "South African Winter Growing Oxalis". After seeing and hearing Michael's slide presentation on *Oxalis*, his auction of *Oxalis* items went like hot cakes.

What followed next was, to me, one of the most interesting presentations I have had the privilege of hearing, and that was Phillip Adams' program on "Lycoris: Jewels of the Bulb World, Species, Culture and selected Hybrids." Phillip is from Mississippi but lives and works in the Los Angeles area.

James Bauml, Botanist at the Los Angeles

County Arboretum, took us on a fascinating trip to Mexico with "Hymenocallis and other Bulbs of Mexico."

Ending the Symposium presentations on Sunday morning was distinguished author and *Clivia* enthusiast, Harold Koopowitz on "Modern Clivias and Future Trends." Harold has just written his latest book on CLIVIAS with photographs by James Comstock and the Forward by Sir Peter Smithers. This is a must have for those interested in this South African amaryllid. Timber Press is the publisher of the book.

The bulb auction was a great success thanks to the talents of auctioneer Charles Hardman. I do not know of anyone who went home without something new and exciting to grow!

The International Bulb Society recognized two outstanding individuals in its 2002 awards presentation: Herbert Medalist, Dr. Marcel Le Nard of France, and Hamilton P. Traub Award, Mr. Michael Vassar of California, USA.

Special thanks to the following people for their cooperation, generosity and kindness, which helped to make this symposium a success: Phillip Adams, Jerry Ainsworth, Kathy Andersen, James Bauml, Patty Colville, Mike Craib, Dan Davids, Jim Folsom, Catherine Ghan, Charles Hardman, Molly Hitchcock, Kelly Irvin, Herb Kelly, Kent Kelly, Pam Kelly, Harold Koopowitz, Dave Lehmler, Laura Lyons, Alan Meerow, Joyce Miller, Cynthia Mueller, Pacific Horticulture, Dell

Sherk, Jim Shields, Russell Stafford, Claude Sweet, Boyce Tankersley, Arnold Trachtenberg, Michael Vassar and Doug Westfall.

Local meeting of the Pacific Bulb Society

Saturday, August 10, 2002, 10:00 am. Jane McGary will host the next local meeting of the Pacific Bulb Society in Portland, Oregon. Please contact Jane McGary for details. Phone: 503-630-3399 E-mail: JaneMcGary@earthlink.net



L to R: Herbert Kelly Jr, Director of IBS Awards & Recognition; Michael Vassar, recipient; and Robert M. Turley, President of IBS. Photo Arnold Trachtenberg



As many of the participants who could be rounded up on the last day of the Symposium.

Photo Bill Dijk

From New Zealand . . .

Tony Palmer

The item below about a well-known IBS Life Member, Terry Hatch, is reproduced by kind permission of the New Zealand *Commercial Horticulture* magazine:

“The Royal New Zealand Institute of Horticulture has created three new Associates of Honour - Terry Hatch (Auckland), David Shillito (Christchurch) and Gordon Collier (Taihape).

Associates of Honour are awarded “to persons who have given distinguished service to horticulture in New Zealand.” Here are extracts from the citations:

Terence Charles Hatch

An industry character, Terry was born in Hackney, London, claims Huguenots, flower growers and plantsmen are ancestors and boasts the plant growing gene is deeply embedded in his makeup.

His initial horticultural achievements included mustard cress (aged 2-3), a fascination for his aunt’s alstroemerias (5) and by eight, was flowering dodecatheons and swapping auriculas with relations.

When his attention switched to cacti, his father built him several glasshouses to accommodate his collection. Aged 11 Terry worked after school in several nurseries and at 15 became an apprentice to the local parks department and became a 1st Class Certificated Gardener in 1962.

National service with the Royal Air Force in Cyprus interrupted his training but in his spare time he collected wild cyclamen and tulip seed.

In 1963, Terry and his wife Pam emigrated to New Zealand where he worked for Pettit’s Nursery (Otahuhu) then set up on his own producing rock and alpine plants, perennials, bulbs and groundcovers. The nursery shifted to Runciman Road, Pukekohe East and Joy Plants became Mecca for serious Auckland gardeners.

Terry travelled widely, collecting plants and seed throughout the world and has bred *Alstroemeria* ‘Pink Joy’, *Osteospermum* ‘Whirlygig’ and ‘Whirly Pink’, and *Cheiranthus* ‘Joy Gold’ and ‘Winter Joy’ and was awarded the Institute’s Plant Raiser’s Award in 1992. He

has developed a wonderful series of nerines including a tall sparkling white (Peace Dove), is developing clivias and has returned to one of his first and greatest loves, *Helleborus*.

Terry is committed to conservation, has helped eradicate cats from Little Barrier Island and has raised and planted over 110,000 mixed natives and 25,000 to 30,000 pohutukawa on Great Mercury Island.



Pam and Terry Hatch. Tony Palmer

He was a foundation member of the New Zealand International Plant Propagators’ Society, was RNZIH regional chairman (1981/2), and is currently president of the Friends, Auckland Regional Botanic Gardens. He lectures and has written extensively. He co-authored *Bulbs for New Zealand Gardeners and Collectors* with Jack Hobbs. His recent work, *Grandad Went to Africa*, has a serious message and profits go to South African’s Green Trust to help create a sustainable ecological future for the black communities of the Cape.”

Inaugural New Zealand Clivia Show

A steering committee has been formed to organise the inaugural New Zealand Clivia Show which is scheduled to be held at the Auckland Botanic Garden on the weekend of 12 - 13 October 2002.

The format will be:

- A display illustrating as far as possible *Clivia* species and their development in cultivation. Plants will be lent by those of us with collections and will be staged by staff of the botanic garden. Clivias will be displayed in association with other plants hopefully representative of plants which grow in association with *Clivia* in natural habitat.

- A display of specimen potted plants illustrating the variation which exists especially within *C. minia ta*.

- Provision to display cut blooms.

- A display of *Clivia* flowers and leaves used in floral arrangements. [No competitive element is envisaged for this inaugural show.]

- Individual stalls where exhibitors can sell plants. Exhibitors to pay 10% of their takings to the show.

- Information sheets will be prepared on

- A. Background of the genus.

- B. Growing guide

- C. A questionnaire seeking interest in the possible formation of a New Zealand Clivia Club.

- Practical workshops and slide shows will be held throughout the weekend

- Admission to the show will be by way of gold (coloured) coin donation.

From South Africa . . .

Autumn in South Africa

Rachel Saunders

We have just returned to Cape Town from a three-week trip around South Africa. In the majority of the country, which receives summer rain, all the flora is preparing for winter. The grasses are in seed and turning brown, the deciduous trees are dropping their leaves, and the bulbous/cormous plants are going dormant. The nights are cold and in some areas, frosty, and the ground is beginning to dry out.

However, the Western Cape flora is just

waking up after a long, hot, dry summer, and the first autumn rains have fallen in Cape Town and further north. We came home via Namaqualand where we hoped to see the flowers commonly called "Maartblomme" or "March flowers" - the autumn flowering Amaryllids. Although it wasn't the best display we had ever seen, we had 3 lovely days of flower and seed hunting.

Up in the arid north, close to the Namibian border, we found *Haemanthus namaquensis* in full seed. The flower stalks are about 25cm long, topped by huge bunches of bright red fleshy seeds similar to cherries. For some reason they had flowered extremely well and they were easy to find amongst the sparse desert vegetation. We then moved southwards to Springbok, which was very dry, and apart from some scattered *Brunsvigia bosmaniae*, we found nothing in flower or seed. Moving south again to Kamieskroon, we found *Haemanthus amarylloides* subsp. *polyanthus* in seed, with their glistening white fleshy coverings. Normally the SW Cape, a Mediterranean area, receives a small amount of summer rain, but this last January (mid-summer) was one of the wettest on record, and obviously some of that rain moved as far north as Namaqualand.

The next day we spent at Nieuwoudtville where we found Amaryllids both in flower and seed. Seed-bearers were *Crossyne flava*, *Brunsvigia bosmaniae*, *Haemanthus barkerae* and *H. amarylloides* subsp. *amarylloides*. In flower were some late *Crossyne flava* with their strange yellow flowers, scattered *Brunsvigia bosmaniae* and several species of *Hessee* and *Strumaria*, those small Amaryllids with white or pink flowers. Some are beautiful on their own, for example *Hessee breviflora* and *stellaris* with their 15cm umbels of dark pink flowers, while others are small and are really only striking when flowering en masse, eg *Strumaria tenella* and *S. discifera*. *Strumaria watermeyeri* and *salteri* were both in bud and the first pale pink flowers were opening.

Apart from the Amaryllids, the first of the polyxenas and syringodeas were flowering in the area. Syringodeas are similar to romuleas with small, star-shaped, mauve flowers. They normally form huge colonies and, when in flower, make huge mauve sheets across the ground. They have an unusual characteristic in that their seed capsules are borne just below the soil surface, which makes them extremely difficult to harvest,

and this probably explains the large tightly packed colonies as well.

As we drove south to Cape Town, the vegetation became greener and greener as the rainfall increased. It is raining again now, so hopefully this winter and spring will bring a good flower display again.

From Australia . . .

Growing Bulbs in Australia

Bill Richardson

Every year I await eagerly for autumn to arrive as this is the time to sow winter growing bulbous seeds. Many of them flower early during the winter months to add color to this dreary time of the year. This experience of growing from seed and following the cycles through to flowering stage can be time consuming but quite fascinating. It is well worth the effort and experience. As the winter approaches, the newly sown seeds flourish and grow while the previous years sowings hopefully will give you the reward of beautiful flowers.

Although many of my bulbous plants are grown in pots, I have recently ventured out into the garden and planted out a bulbous garden bed using many bulbs I have grown from seed. These I have mixed with other plants that grow too large for pots.



Ferraria crispa. Tony Palmer

Here are a few examples of what I have planted out: *Crinum*, *Haemanthus*, *Albuca*, *Ferraria*, *Tulbaghia*, plus others mixed with *Canna*, *Arum*, *Chasmanthe*, *Dianella*, *Lachenalia* and *Doryanthes*.

I have made some observations regarding these plantings which may be of interest.

Haemanthus coccineus: flowered earlier when grown in pots and produced seed, whereas the garden plants flowered later and produced no seed.

Ferraria crispa: put on the most beautiful display of green growth but not one flower. I have left them in the ground during the dry spell to see what results will be achieved next season.

Albuca spiralis (I think): thrived and produced massive leaves and flowers spikes up to 5 or 6 feet high. Most impressive.

Crinum moorei: multiplied by sending offshoots up but did not flower. Potted plants achieved the same results but leaves are in better condition.

Tulbaghia violacea: I used this as a border planting along the edge and it gives a constant display of flowers. My two Yorkshire Terriers love sitting on it and it emits a very strong garlic perfume throughout the garden.

Also in this garden is the lovely *Dianella tasmanica* which spreads quite rapidly and even emerges under the garden path. All the *Chasmanthe* species make a good display and are one of the early flowerers here with the exception of *C. var. duckettii*, which flowers late.

Doryanthes palmerii is also in the garden but doesn't seem to do so well here, although I saw a huge clump of this in the Adelaide Botanical Gardens which gave me a scare as I envisaged my own plants getting that big and taking over the garden. I've got my eye on it now!

Many of my plants are in pots as they are not suitable for the garden because of the danger of frosts and the wet weather we have. One of these is *Whiteheadia bifolia*, which is one of my favorite unusual species with its two large leaves and long green flower spikes. My *Haemanthus albiflos*, which I have been splitting up and repotting for about ten years so that I now have dozens of pots, give me the most remarkable flowering display every year and are a real talking point here. I must keep them in a protected area here from the frost.

A few years ago, a pot of *Lachenalia rubida* got left in the shed here for a long period of time. It was flowering beautifully when I found it, with no light, no water and no attention. This year, as an experiment, I repeat the exercise with the same result. Quite a remarkable achievement, it is also one of the first to flower here each winter.



Lachenalia rubida. Tony Palmer

Polyxena is usually the second species to flower in Gippsland, with the sweetest and strongest perfume that fills the air around you.

These are but a few of the species that I grow which take up most of my spare time, but in the last few years I have become interested in *Hippeastrum* and have quite a lot of lovely seedlings coming along.

Some other species worth growing that flower during the winter in Australia are *Anemone*, *Bulbine*, *Bulbinella*, *Crocus*, *Cyclamen*, *Freesia*, *Hesperantha*, *Iris*, and of course my favorite, *Ixia*.

In August you can start planting your summer flowering bulbs in Australia. September is the time to deadhead bulbous plants as the flowers finish to ensure they produce flowers next season and not seeds. In October you can plant out your Dahlia tubers.

Bulb growers interested in growing South African species from seed should consider joining two Societies. One is the "Botanical Society of South Africa" and the second is the "Indigenous Bulb Growers of S.A", who both put out yearly seed lists of stock available. They can also provide suitable books on bulbs, which are hard to obtain in Australia. Currently available is the "*Eastern Cape, South African Wildflower Guide 11*", by John Manning, plus many other interesting titles.

If you would like to contribute either some interesting notes and news from your part of the world, or a more substantial feature article, please contact the Editor, Tony Palmer at adpal@ihug.co.nz. Alternatively you can write me at 12 Kelly Road, Oratia, Auckland, New Zealand. I would also welcome feedback on any articles in the current issue. Maybe your experiences are different from those of the authors. If so, let us know and we will all learn something new.

The Genus *Nerine*

Graham Duncan

All photographs by the author

I have always had a strong fascination with nerines and have been growing them for much longer than I care to remember! Endemic to southern Africa, the genus is widely distributed here and centred in the eastern and northern parts of South Africa. It comprises approximately twenty-five species, very few of which are in general cultivation. However, three species, *N. bowdenii*, *N. sarniensis* and the plant previously very well known as *N. flexuosa* but now included under *N. undulata*, are important commercially produced crops. Most of the remaining twenty-two species are poorly known even to bulb enthusiasts, and several of these have become extremely rare in the wild over the past few decades. The genus is in urgent need of revision as some species are very variable, with intergradations between species making identification difficult. With a view to popularising *Nerine* species, I have recently



Nerine sarniensis.

completed a cultivation guide to the genus, with colour illustrations of all but four of the species.

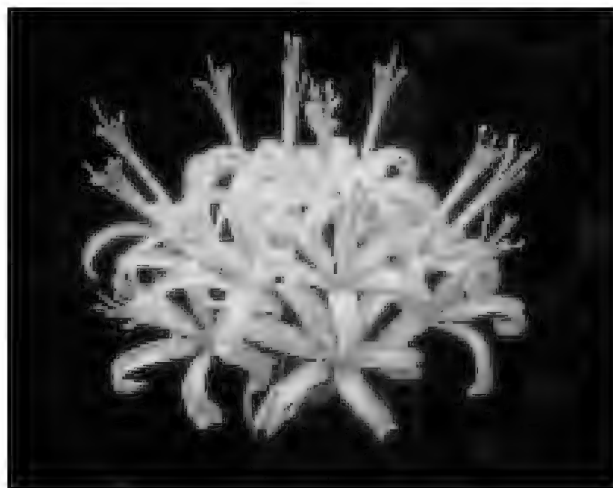
Nerine sarniensis, widely considered the most beautiful of all the nerines, has had quite a colourful history. The often-told but unlikely tale of how boxes of bulbs of this plant washed up on the shores of Guernsey in the Channel Islands in 1659, as a result of a Dutch or English shipwreck, and flourished there, has become something of a botanical legend.

Actually, it was originally thought to have been a native of Japan! The mistaken assumption

that *N. sarniensis* originated in Japan almost certainly stems from confusion with the superficial resemblance it has to the rose-red or scarlet flowers, and similar strap-shaped foliage, of the amaryllid *Lycoris radiata*. The latter is endemic to Japan, and is known to have occurred on surrounding hills above the port city of Nagasaki, overlooking its famous harbour.

Whatever the truth may be regarding how *N. sarniensis* came to be grown on Guernsey, the fact remains it has been cultivated there for more than three centuries, and continues to be grown there for its cut flowers. In fact, the Guernsey lily became such a familiar sight on the island that in 1958, a 3d. postage stamp depicting it was issued there. Similarly, *Amaryllis belladonna*, a native of the Western Cape Province of South Africa, has become naturalised on neighbouring Jersey, where it is today boldly depicted on postcards, and is resolutely referred to as the Jersey lily!

It was the Rev. William Herbert, cleric and amaryllid expert, after whom the International Bulb Society's official journal *Herbertia* takes its name, who established the genus *Nerine* in 1820. It is unclear whether he named it for Nerine, the Greek mythological sea nymph and daughter of sea God Nereis and Doris, or for Nereide, the daughter of Nereus, son of Oceanus. The plant takes its specific name from Sarnia, the Roman name for Guernsey. Herbert was also one of the first to work in the field of hybridising nerines.



Nerine sarniensis 'Kirstenbosch White'.

Over the past three hundred years, more than a thousand man-made hybrids as well as cultivars, principally of *N. sarniensis*, have been raised in various parts of the world. More recently, Sir Peter Smithers began an extensive *N. sarniensis* breeding programme in the 1960s and 1970s in England and Switzerland, and produced numerous magnificent new hybrids, notably in the purple colour range. In 1995 his superb collection was acquired by Exbury Gardens, where the tradition of *Nerine* breeding, started by Lionel de Rothschild after World War One, is once again being continued by Nicholas de Rothschild.

Cultivation

Success with the cultivation of nerines begins with a sound knowledge of which growth cycle the species in question falls under, and to this end nerines can be placed into three distinct groups: exclusively winter-growing, exclusively summer-growing, and evergreen species. The winter-growing group require an absolutely dry summer dormant period; the summer-growing species require an absolutely dry winter dormant period; and the evergreens, although almost all summer-growing and winter-dormant in their wild habitats, usually continue to maintain leaf growth during the winter months when grown in temperate climates, or under greenhouse



Nerine bowdenii.

protection. The only reliably hardy species is *N. bowdenii*, but the white form of *N. undulata* (previously known as *N. flexuosa* 'Alba') is fairly hardy out of doors in the United Kingdom and in The Netherlands.

Most nerines require a very sunny aspect for healthy growth and flowering to take place. Species from montane habitats like *N. bowdenii*,

N. humilis, and *N. sarniensis* prefer a situation receiving morning sun and afternoon shade, whereas grassland species like *N. filifolia* and *N. krigel*, and those from arid areas like *N. huttoniae* and *N. laticoma*, thrive on full sun all day, or for as much of the day as possible. The evergreen forms of *N. undulata* prefer light shade, including the plant previously known as *N. flexuosa*, now included under *N. undulata*.



Nerine undulata.

The four winter-growing species: *N. humilis*, *N. pudica*, *N. ridleyi*, and *N. sarniensis*, do not grow well in very humid climates, whereas most of the other species can be grown successfully either in humid areas or where dry summer heat is experienced. Whereas all *Nerine* species can be successfully cultivated in containers, only certain species are suited to general garden cultivation, depending mainly on climatic conditions and the irrigation regime of the garden in question. In mild climate areas, such as coastal parts of southern California and the winter rainfall region of the Western Cape in South Africa, tough species like *N. filifolia*, *N. krigel*, and *N. masoniorum* can be grown out in the open. They easily withstand heavy winter rainfall during their winter dormant period, provided that the soil is well drained. Bulbs of species from arid



Nerine masoniorum.

habitats, like *N. huttoniae* and *N. laticoma*, will soon rot under wet winter conditions and must be grown in pots which can be stored dry over the winter dormant period. In many instances, container cultivation is the only feasible manner in which to grow the more delicate dwarf species like *N. gaberonsensis* and *N. rehmannii*. In the Northern Hemisphere, terracotta pots are highly recommended for nerines but in Southern Hemisphere countries they tend to dry out far too quickly and need much more frequent watering.

Perfect drainage of the growing medium is one of the most important factors when cultivating nerines, particularly in containers. Nerines are tolerant of a wide range of soils, but it is important to note that they should never be grown in very rich soil, as under these conditions they tend to produce luxuriant foliage at the expense of flowers. Similarly, liquid and granular fertilizers should not be used at all. Ideally, the soil pH should be slightly acid to neutral. Every grower will discover his/her own ideal growing medium, and at Kirstenbosch I use a mix of washed river sand or silica sand (swimming pool sand), mixed in varying quantities with finely sifted compost. In the United Kingdom, John Innes number 2 compost is recommended for nerines. I grow easily cultivated species like *N. filifolia* and *N. krigei* in a mix of equal parts of sand and compost, whereas for more tricky species like *N. laticoma*, the amount of compost is reduced considerably. *Nerine* bulbs, like all other amaryllids, have perennial fleshy roots that resent disturbance. Once bulbs have been planted, they should be left in the same position

for many years until they become too overcrowded and flowering performance diminishes.

The bulbs of most *Nerine* species grow very close to the surface, but it is important that the various species are planted at the correct depth. The winter-growing species, like *N. sarniensis* and *N. humilis*, prefer to have their necks partially exposed, whereas the exclusively summer-growing species, like *N. krigei* and *N. huttoniae*, should be planted so that the top of the neck rests just below soil level. The bulbs belonging to the evergreen group of species, which have thread-like leaves, can be planted with their necks at, just below, or just above soil level. Watering procedure is very important, and for actively growing nerines I have found it best to water heavily at well spaced, regular intervals.



Nerine humilis.

During the active growing period, a heavy watering every two weeks is suggested for both winter- and summer-growing species, allowing the soil medium to dry out almost completely in between.

The *Nerine* species: Winter-Growing

The four exclusively winter-growing species are *N. humilis*, *N. pudica*, *N. ridleyi*, and *N. sarniensis*. They all occur naturally on mineral-poor, acid sandstone soils and flower in autumn, just before, or as the new leaves begin to appear. Having very high ornamental value, *N. sarniensis* is by far the most widely cultivated of these, followed by the very variable and widespread *N. humilis*. *N. pudica* is grown to a very limited extent in South Africa and the United Kingdom,



Nerine ridleyi.

and as far as I know, *N. ridleyi* is only in cultivation at Kirstenbosch. The latter is a most beautiful species, strongly reminiscent of *N. sarniensis*, but even more notorious for erratic flowering performance.

Summer-Growing

The five exclusively summer-growing species are *N. bowdenii*, *N. huttoniae*, *N. krigei*, *N. laticoma*, and *N. marincowitzii*. From a horticultural viewpoint, by far the most important of all the nerines is *N. bowdenii*, several cultivars of which are grown on a very large scale in The Netherlands, primarily for the cutflower industry. It is the only reliably hardy member of the genus and in its natural habitat grows in leaf litter on



Nerine laticoma.

steep, south facing slopes. Like *N. sarniensis*, it is notoriously erratic in its flowering performance. *N. huttoniae* and *N. laticoma*, which look very similar and in certain respects resemble the genus *Brunsvigia*, differ in minor taxonomic details although the two species are widely separated geographically. *N. huttoniae* is restricted to the Eastern Cape Province of South Africa, whereas *N. laticoma* occurs across a vast area of southern Africa stretching from northern Namibia to Botswana, and throughout most of the eastern and northern parts of South Africa. *N. krigei* is

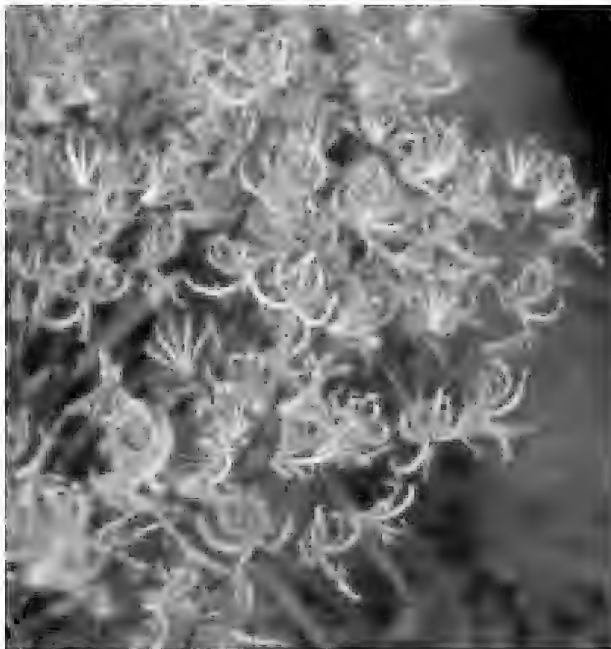


Nerine krigei.

one of the most under-rated of all the species and it is an easily grown subject with medium-sized, dark pink flower heads and ornamental, spirally twisted leaves. It thrives in almost any soil provided that it is well drained, receives full sun or very high light intensity during summer, and is kept as dry as possible during winter. *N. marincowitzii* is the most recent discovery, restricted to just one known locality in the dry Western Cape interior. It is a highly attractive dwarf species, with pale pink flowers with white throats, and is extremely rare in cultivation.

Evergreen

The evergreen group of nerines is by far the largest, comprising sixteen species, which occur mainly in the eastern and northern parts of South Africa. These are *N. angustifolia*, *N. appendiculata*, *N. filamentosa*, *N. filifolia*, *N. frithii*, *N. gaberonsensis*, *N. gibsonii*, *N. gracilis*, *N. hesseoides*, *N. masoniorum*, *N. pancratioides*, *N. platypetala*, *N. pusilla*, *N. rehmannii*, *N. transvaalensis*, and *N. undulata*. Almost all of them have numerous very narrow, thread-like leaves. The most easily and widely cultivated of these species is undoubtedly *N. filifolia*, that gregarious and most reliably floriferous species from the Eastern Cape, which just thrives on



Nerine filifolia.

neglect and never stops multiplying. *N. angustifolia* and *N. appendiculata*, two pink-flowered species with very long flower stems, look very similar indeed and are separated mainly on the grounds that *N. appendiculata* has appendages at the base of its stamens, whereas these are absent in *N. angustifolia*.

N. filamentosa, *N. gibsonii*, and *N. masoniorum*, all from the Eastern Cape, are the three rarest members of the genus. *N. gibsonii* has long broad perianth segments ranging in colour from pure white to dark purple, but unfortunately it is shy to flower in cultivation. *N. masoniorum*, on the other hand, is probably the most floriferous of all the species, producing its dainty small flower heads in late summer and early autumn. *N. filamentosa* produces such



Nerine gibsonii.

elegant flowers with prominent long straight stamens and heavily rolled back perianth segments. It really deserves to be widely cultivated and does wonderfully well in pots. Both *N. gibsonii* and *N. masoniorum* are close to extinction in nature due to habitat degradation caused by encroaching informal settlements and overgrazing, but fortunately *N. filamentosa* still survives on private farmland.

N. frithii is a most beautiful dwarf species with very narrow, spirally twisted leaves and white or pale pink flowers with maroon markings to its perianth segments. It occurs in depressions of dolomitic limestone outcrops which are seasonally inundated. It resembles the rare and



Nerine filamentosa.

truly dwarf *N. hesseoides* in flower colour, but its perianth segments are arranged irregularly whereas those of *N. hesseoides* are regular and have long appendages at the base of its stamens. The distribution of these two species overlaps in the western and northern parts of the North West Province.

N. gaberonensis, a bright pink-flowered plant from the dry southern parts of Botswana, the Northern Cape, and western parts of the Northern Province, has great potential as a container subject as it is very floriferous and multiplies well.

Very little is known about the seldom seen *N. pusilla* from arid eastern Namibia. It resembles *N. filifolia* in its pink flowers and thread-like leaves, but as far as I'm aware it is not in cultivation anywhere.

Several nerines are stimulated into profuse flowering due to the effect of natural bush fires in their wild habitats, notably the four winter-growing species, but they are not dependent on fire for flowering. *N. pancratioides* however, a most unusual white-flowered plant from KwaZulu-Natal Province of South Africa, only produces flowers following summer bush fires.

N. platypetala, another unusual species, has broad, flat perianth segments, and occurs in perennial marshes in acidic, black fibrous soil. It hasn't been in cultivation for very long, but it flowers regularly every year and makes a charming container subject.



Nerine platypetala.

I have never seen *N. gracilis* in the living state, but it has very distinctive pale to dark pink, cup-shaped flowers, each perianth segment with a distinct green keel on the lower surface. I suspect this plant has been lost in cultivation and I have not yet managed to obtain material from the wild.

N. rehmannii is a dwarf species from Gauteng and Mpumalanga Provinces, with prominent stamens and pure white, heavily reflexed perianth segments flushed with pink on the undersides. Its leaves are exceptionally narrow, ranging from 0.5 – 1.0 mm wide.

N. transvaalensis has proved to be the most elusive of all the nerines. It was described and illustrated in 1928 from a specimen whose wild origin somewhere in the erstwhile Transvaal Province was not recorded, and has never been seen since. It has pale pink flowers with distinctive appendages forming a tight circle at the base of the stamens.

N. undulata from the Eastern Cape is a very variable species as regards perianth segment length and width, degree of waviness of perianth segment margins, length of peduncle and habitat preference. Certain forms occur in wetland marshes in full sun, whereas others occur on semi-shaded slopes of forest verges. Certainly the latter form is one of the most outstanding of all nerines, flowering in mid-winter in South Africa, and producing strong, long flower stems suitable for the cutflower industry.

Reference

Duncan, G.D. 2002. *Grow Nerines*. Kirstenbosch Gardening Series. National Botanical Institute, Cape Town.



Graham Duncan with Herbert Medal.

Biography

*I joined the horticultural staff at Kirstenbosch in 1979, where I am specialist horticulturist and Curator of the South African indigenous bulbous plants collection. My particular taxonomic interest is the genus *Lachenalia*, and in 1988 I wrote 'The *Lachenalia* Handbook', which is Vol. 17 in the *Annals of Kirstenbosch Botanic Gardens*. In 1989 I collaborated with Prof. Niel Du Plessis and botanical artist Elise Bodley to produce the book 'Bulbous Plants of Southern Africa'.*

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Bill and Willy Dijk of Daffodil Acre

Tony Palmer

All photographs by Bill Dijk except where noted

It had been a wet and windy Easter holiday in Auckland and I was glad that I had the rest of the week off work, as better weather was forecast. On April 3rd my wife Jenny and I set off to drive the 200 km to Tauranga, a very pleasant, rapidly developing port town in the Bay of Plenty, on the east coast of the North Island of New Zealand. The purpose of our trip was to visit Bill and Willy Dijk, bulb growers par excellence, and to interview them for this article.

There were still a few showers around as we left Auckland, but when we arrived in Tauranga around lunchtime it was a beautiful sunny, if somewhat cool day. Willy welcomed us to their home, Daffodil Acre. Bill was hard at work in the nursery, she said, re-potting as many bulbs as possible before his overseas trip, which would include attending the IBS Symposium in the States and a visit back to Holland.

Looking down from their wooden deck we could see Bill working away in the distance in his shorts. He was lugging heavy polystyrene trays full of *Oxalis* around and arranging them in neat rows on wooden runners to keep them off the ground and away from the occasional flash floods they've experienced in previous years. Willy made some coffee and asked me to go down and fetch Bill in for it. Now I'm not particularly partial to cold coffee, but it was stone cold by the time I was able to drag Bill inside! In the meantime he had already shown me all his many species of *Oxalis*, as well as much of the

rest of the nursery, enthusing about his treasures in his typical animated way.

As always, Bill and Willy, a likeable, straight talking couple, quickly made us feel at home as lunch was served and the chat really got under way. After lunch Bill suggested a visit to Jim Forrest who lives not far away. Jim is a retired headmaster with a passion for plants, especially his collection of rare bulbs, many of which he keeps at Daffodil Acre now. His garden is quite small, but he manages to cram in an amazing array of plants, from cacti and succulents to bulbs, with many rampant climbers over trellises as well. We saw quite a few plants I've never even heard of before!



Some of you lucky ones will be growing this *Brunsvigia* seed by now. Tony Palmer

Back to Daffodil Acre and a nursery tour for all of us this time. I was hoping to get some photos but the light was already fading fast. Still we got around just about everything, marvelling at sights as diverse as the huge flower heads of their many *Brunsvigia gregaria*, to the strong, healthy new shoots of the many trilliums that Bill grows so well. However, the most amazing sight had to be the trays full of fat, rudely healthy *Tecophilaea* bulbs. Mind you Bill got a bit grumpy when he noticed a bird had been fossicking around in them, throwing some under the wooden benches. Another find under those



Wall to wall polystyrene!

benches was an *Oxalis* species with the biggest foliage I've ever seen on one. It's called *O. triangularis* and its leaves are very dark purple with a lighter mauve central area.

We were finally persuaded to go back to the house, but only because it was just about dark and getting quite chilly. We were treated to a lovely dinner, after which we got down to talking about the Dijks and how they came to start a nursery.

Bill and Willy emigrated to New Zealand 40 years ago from Holland. They were married on a Saturday and flew out on the following Thursday! Sounds straightforward, but it wasn't and New Zealand nearly missed out on their considerable talents. Bill was keen to emigrate; having friends already in New Zealand who could arrange work and accommodation for them. Unfortunately Willy never wanted to emigrate and they even broke off their relationship for a while. However, at the time they were both doing evening classes and kept attending them together, even though they weren't 'going out' any more. Willy's mother eventually told them to make a choice one way or the other and they drifted together again, but Willy was still not keen to emigrate. Bill then suggested he go first to set things up and then she could follow. "If you do that, I'll never come" she said. Fortunately for us they finally sorted themselves out, but Willy's mother would not allow them to go as an engaged couple so they got married just before they left. "A shotgun wedding" joked Bill.

The assisted passage cost £40 for the 2 of them, and when they arrived they were given £36 for expenses, so for £2 each they were flown from Holland to New Zealand in a DC8. (£1 in those days would equal approximately 1 US dollar today). They were supposed to go to an orchard in Central Otago, where Bill was to work full time for £5 a week and accommodation, and Willy was expected to cook for all the fruit pickers. People in Invercargill (on the south coast of the South Island) told them it was in the middle of nowhere, so they refused to go and stayed in Invercargill instead!

Bill worked at first at the Freezing Works for £20 a week, a much healthier sum than he would have got at the orchard. Mind you a couple of his tasks, extracting gall bladders and packing sweetbreads, had to be well paid to make them bearable I would have thought. Willy, who lost her job after a few months when she became pregnant with the first of their five

children, was very homesick for the first couple of years. She was not helped by the fact that they lived in a street where there were a lot of other Dutch people who tended to get together and moan about the New Zealand way of life, comparing it unfavourably to what they had left behind in Holland.

In their spare time Bill and Willy started growing daffodils. When they moved to Tauranga they planted daffodils too. Bill worked in orchards there, doing contract pruning of kiwifruit, but as their bulb collection grew in size and scope it soon became too big to keep just as a hobby. They were on the slippery slope and eventually decided to start a bulb nursery. I wonder how many similar businesses have started in the same way.

Although the collection was only half what they have now it was starting to become a disease - everything became a "must have". Every time Bill went to a Show, often in the South Island, he took the van packed with a trade display of flowers and came back with a van full of trilliums as a result of swapping! About 15 years ago Bill started some serious breeding work, mainly of miniature daffodils at that stage. His very first one was 'Tweety Bird' which is nearly lost now. Then came 'Little Becky' and 'Little Emma' which were popular and nice for showing. The most popular so far, 'Little Flick', was the result of an unusual cross between *N. calcicola* and *N. gaditanus* which Bill never thought would take.



The popular 'Little Flick'.

It's very dwarf, very miniature, and vigorous with 3-4 flowers per stem. They started with 2 or 3 bulbs and now have over a thousand. At first it looked as though they would never flower. They just kept multiplying, which Bill thought that was the fault of *N. gaditanus*, with it's reputation for being a very shy flowerer. Then one year, all of a sudden, they burst into a profusion of flowers which just about hid the foliage.

Talk of the shy flowering of *N. gaditanus* turned our thoughts to another species that so many people find difficult to flower, *N. canaliculatus*. Bill's recipe is to treat it rough, as he reckons it thrives on abuse. Plant just about on the top of the ground in the poorest, hottest possible spot in the garden. Even jump on it a few times, but never coddle it, he advises.

I asked Bill what his favourite bulbs are, which he thought at first was a bit of a silly question and he went unusually quiet and thoughtful. Then suddenly he said, "No, hang on a minute, it's *Tecophilaea*, *Cyrtanthus* and miniature daffodils, in that order". He enjoys the



Cyrtanthus obliquus.

and he makes up his own mixes. For the likes of moraeas, lapeirousias and romuleas he does a mix with plenty of pumice whereas for trilliums he puts in more composted bark or peat. He thinks the composted bark is better than peat - and cheaper too!

He remarked that what worries him more than the mix is the elements of Nature, such as rain and frost. He covers every bed with special frost cloth when conditions are conducive to a frost. This takes him about half an hour morning and night, and sometimes he has to leave it on until lunchtime if the plants are very cold and wet. If another frost is forecast for the following night, he will leave it on all the time. A constant worry, as failure to protect leads to damage, particularly on the young growth of bulbs like lachenalias and freesias, even with a light frost. Later on as they mature they will stand a few degrees more frost without damage. One night last year there was no frost forecast, but everywhere was white in the morning and Bill had to quickly get out with the hoses. Still a lot of damage was done. If you do get caught you can minimise the risk to a certain extent by watering the plants before the sun comes up. When the sun hits the foliage whilst frozen, it's too late, and 24 hours later they turn to black mush.

Their worst pest is the Narcissus fly, both the greater and lesser flies, especially in things like *Hippeastrum papilio*, *Brunsvigia*, *Zephyranthes* and, of course, the miniature daffodils in which they sometimes have serious



L to R *Tecophilaea cyanocrocus* var. *violacea*
T. cyanocrocus *T. cyanocrocus* var. *leichtlinii*.

challenge of getting *Cyrtanthus* to flower well. They need to be grown in the right environment and the right potting mix. They really need looking after, as do *Tecophilaea* of course.

As for potting mixes: was getting the right one just trial and error, I asked. Bill has access to plenty of cheap pumice to provide the free draining mix that he reckons so many bulbs need



Cyrtanthus clavatus.

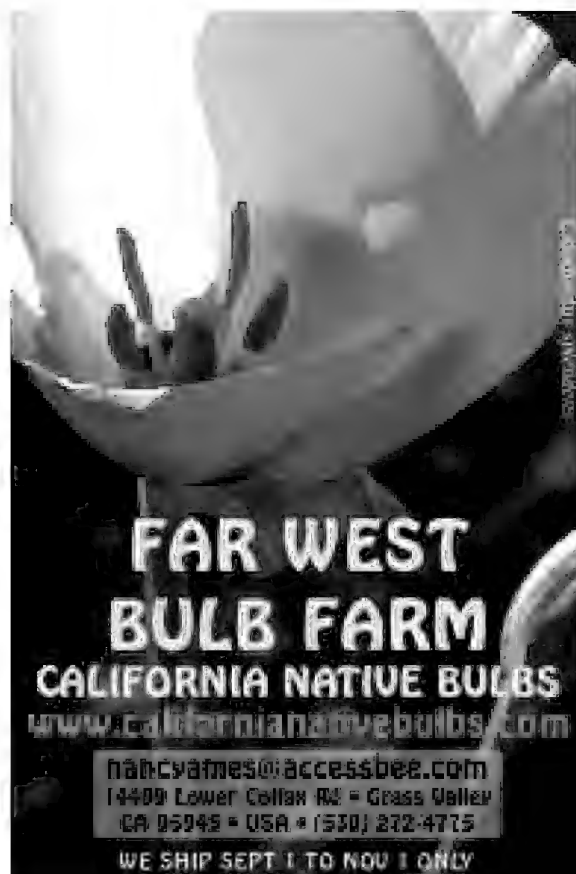
losses of up to 50%, even after dipping (in a 1% solution of Lorsban). They don't use hot water treatment, for which quite sophisticated equipment is needed, as a difference of 2 degrees above or below the recommended temperature can make the difference between not treating them properly and cooking them.

Asked what was the best thing about having a bulb nursery, they said that what really gets the adrenaline going for them is when a new seedling flowers for the first time after waiting for it for 4 or 5 years, especially when it's that one in a hundred that is worth keeping.

What a day! It was getting late but fortunately, even though we were supposed to be driving back to Auckland that night, Bill wouldn't allow us to leave until we'd seen many of his stunning bulb photographs, some of which adorn this article.



Cyrtanthus capensis.



Can you help? . . .

I have received an inquiry from a professional gardener in the UK who is hoping to attain National Collection status with his bulb collection of Ipheion. He is attempting to find suppliers/bulb merchants/enthusiasts who may possibly be a source for bulbs for this genus. He provided a mailing address only:

Ian Hunt
7 Evelyn Devonshire Cottages
Hardstoft, Pilsley
Chesterfield
Derbyshire, S45 8AD
United Kingdom

Anyone interested please do not hesitate to contact him.

Dave Lehmler
IBS Membership

CLIVIA *Keith Hammett*

Auckland, New Zealand

All photographs by the author

The growing of ornamental plants is subject to fashion, as are other forms of aesthetic activity. Undoubtedly such changes reflect broader collective ideas and conditions within a society.

Until relatively recently fashions might vary widely between cultures, whether it be with regard to the types of clothing worn or plants grown. However, we live in an era that has been termed the communication revolution. This is certainly having as much influence on the decorative plants that we cultivate, as did the industrial revolution of the eighteenth and nineteenth centuries.

The Internet enables rapid exchange of information, ideas and images worldwide and today there is a plethora of special interest groups discussing a bewildering range of topics. Judging by the ever-increasing flow of messages in the group devoted to the genus *Clivia*, it looks set to become a fashionable plant of the twenty-first century.

The genus *Clivia* is a relatively small genus found only in Southern Africa, and although it is not strictly a bulbous plant it is normally treated as such for literary purposes. The first species to be described was *C. nobilis* in 1828. This was followed in 1854 by *C. miniata*, originally named *Imantophyllum miniatum* but changed 10 years later. *Clivia gardenii* came shortly afterwards in 1856. Eighty-seven years elapsed before *C. caulescens* was named in 1943 and at the time



In *Clivia* flower colour is reflected in the colour of the ripe berries. Orange & red flowered plants produce red berries while yellow forms have yellow berries.

of writing, May 2002, the discovery of a remarkable new species *C. mirabilis* has just been published (Rourke 2002). With the exception of *C. miniata*, which has upright flowers, the other four named species have pendulous flowers and have often been confused in cultivation.

Today wild populations of species occur in relatively small pockets, often widely separated from each other, and in reality the genus appears to be in retreat. As all previously known species of *Clivia* are unable to tolerate full sunlight, its current distribution reflects the progressive destruction of forest vegetation which was formerly much more extensive than it is today.

Clivia caulescens is found in the North East of South Africa from approximately Nelspruit northwards to the Zimbabwe border.



Distinct accessions of *C. gardenii*.



In the wild *C. caulescens* can produce stems several metres long. Such stems could be very old.

world. Only *C. caulescens* and *C. mirabilis* have been named in their country of origin.

It has to be said that until recently it was difficult to identify the pendulous species from the inadequate descriptions that were available in horticultural texts. This has been remedied by enthusiasts working with living plants both in collections and in the wild. Such work has been encouraged by the formation of a Clivia Club, lately Society, in South Africa.

Clivias are slow growing plants, especially *C. nobilis*,

C. nobilis occurs in a coastal strip from Port Elizabeth in Eastern Cape reaching into Transkei. *C. miniata* is distributed from Transkei through Natal and into Kwa Zulu. *C. gardenii* has an apparently similar distribution, although it exploits different ecological niches. Just discovered *C. mirabilis* is remarkable, as its name suggests, in being found 800 km to the west of its nearest neighbour, *C. nobilis*, in an arid, Mediterranean type climate and apparently able to withstand full sun.

Traditionally botanical classification has been based on the morphology or shape of plants, with particular emphasis on the flowers. It is important to remember that a great deal of taxonomic work (classifying) has been carried out on dried specimens mounted on sheets of paper (herbarium specimens) and that for many species the botanist will not have had the opportunity to see living plants. This came about because our ideas on botanical classification are European or Western in origin, and much of the work was carried out at one or other of the great botanical institutes in Europe after specimens had been collected from around the

which in cultivation takes many years before it will flower when raised from seed. In general fruits of *C. miniata*, the most commonly cultivated species, take nine months to mature following pollination. Within populations raised from seed there can be considerable variation in how old a plant may be before it will flower. Some individuals may flower within two to two and a half years from sowing, while others may take ten or more years.

It is important to remember that some characteristics are not fully expressed until a plant has achieved some maturity. First blooms are often poorer than those produced in second and third seasons of flowering. With *C. caulescens*



Very broad-leaved form of *Clivia miniata* developed in Belgium during late nineteenth and early twentieth centuries. Forerunner of Japanese Daruma and modern Chinese forms.

the caulescent stems, which can reach several meters in length in the wild, are seldom seen in cultivation simply because the species has not been widely cultivated for any length of time. It is a matter of conjecture how old plants with very long trailing stems seen in the wild might be. Individual Clivia plants are long lived and some specimens of *C. miniata* have been maintained within a family for several generations. It is therefore feasible that individual plants of *C. caulescens* with very long stems could be a hundred or more years old.

Clivia miniata

C. miniata is the Clivia most commonly encountered in cultivation. Its large upright flowers are showier than the other species and from the time of its introduction to Europe in the 1850s it has been the subject of "improvement" both with regard to flowers and leaves. Its upright flowers alone are normally sufficient for identification. Leaf shape has been greatly modified in cultivation. German and Belgian breeders started to develop broader leaved forms in the late nineteenth century and this trend has been further developed in the Far East. In Japan the squat, broad-leaved Daruma forms have been developed. Much emphasis has been placed on a strict distichous habit, broad downward curving leaves, and perfect precise interlacing of the leaf bases. These characteristics have been further developed in China following



Belgian forms of *C. miniata* often have tulip-shaped flowers, broad leaves and red flowers.

the introduction of this form of Clivia during the 1930s.

The city of Changchun, despite an unlikely climate, has become the center of development of Clivia in China. This occurred historically because the Japanese installed the last Emperor of China as a token leader following their invasion of Manchuria. Changchun was the seat of power for the Emperor and the Japanese Emperor presented the Chinese Emperor with plants of Clivia for use by his court.

After the Second World War the plant slowly became available to more people and in the early 1960s an enthusiasts' organization was established. The plant has, however retained its position as a status symbol. Good quality plants are still considered to be an investment despite a period of grossly inflated prices during the 1980s.

There is a strong body of Clivia breeders in China and competitive shows are held. Detailed criteria of perceived excellence have been developed and interestingly 99% of points are allocated to plant and leaf characteristics, with only 1% for flowers. Leaf width, shape, and surface features are important in determining the value of a plant. This reflects the fact that the plants are always grown in pots and are treated like individual works of art. While the Japanese favour a downward curving leaf, the Chinese prefer them to be more upright.



Unlike many cultivated plants, wild accessions of *C. miniata* can have striking showy flowers.

Almost without exception, whenever a plant has developed a “following” and enthusiasts have formed organizations, the plant has been exotic, and this is the case with the Chinese *Clivia* Association. Although not formalized until 1992, it is significant that the now international *Clivia* Society was formed in South Africa where the plant is indigenous and the people concerned had little knowledge at the time of any developments outside Western Culture.

When a plant develops a following, an interest is taken in tracing the history of the development of the plant in cultivation, as well as the botany of the genus. Inevitably such histories can only be as good as the fragments of information that were recorded. In Britain, Australia and New Zealand a narrow leaved form of *C. miniata* has been referred to as “species” *miniata*. This is widely distributed in frost-free areas of Australasia. It seems likely that this is a single accession, probably from Natal, with moderate sized mid-orange flowers. It is easy to fall into the trap of assuming that the broader leaved forms have been developed from this form, possibly initially unconsciously as larger

flowers were sought. However, since the advent of the *Clivia* Club much interest has been taken in viewing the plant in the wild, especially in previously inaccessible regions such as the Transkei. Unlike many cultivated plants, some of these new “wild” accessions have been more spectacular than many plants already in cultivation.

As broader leaved forms of *C. miniata* occur in the wild, it is entirely likely that quite a number of unrecorded distinct accessions found their way to Europe and formed the basis of European breeding. In fact coloured illustrations from horticultural publications from the 1880s clearly suggest that breeders were using accessions distinct from the common form. These were often given names such as *Maxima*, *Robusta*, *Splendens* and *Grandiflora*.

At this time, more work is required to distinguish between the early work of breeders in Germany and Belgium. However, large flowered broad-leaved forms were developed which became known as “Belgium Hybrids” [albeit intra-specific hybrids]. Often the flowers of these had stronger red colouration and tulip



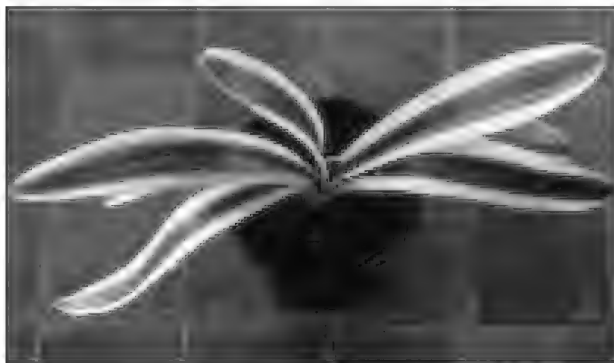
Walter's Yellow. Good quality clone of yellow *Clivia* raised in Australia.

shaped flowers. Such plants were grown as houseplants like aspidistras and could become very large and take many years to flower when raised from seed.

After the Second World War the emphasis of European commercial breeding changed to produce a plant with the ability to flower within two to two and a half years from seed. Such plants are sold in relatively large numbers as a commodity and are shipped before the flowers are fully open. These plants are smaller, may have narrower leaves, and flower form can be variable.

It is enthusiasts, primarily hobbyists, who have explored the possibilities of different flower shapes and colourings. Often they have worked in relative isolation from each other, even if located in the same area. Today considerable variation exists with regard to flower shape, colour combinations, leaf form, and leaf variegation, but it is only since the advent of the Clivia Club and its offshoot the Clivia Net Group that there has been an explosion in the exchange of information and plant material. With the bringing together of ideas and material developed separately in Europe, USA, Australasia, Japan and China the next few years will be very exciting.

Much mystique has been associated with yellow or cream flowered forms of *C. miniata*. The "wild type" orange colour results from water-soluble anthocyanin pigments superimposed over a yellow background of carotenoid pigment



Variegation occurs regularly in some seed-lines of *C. miniata*, but specimens with stable well balanced markings such as this one are rare.

contained in discrete plastids. Mutations occur where the formation of the anthocyanins is blocked, resulting in cream or yellow flowers.

Such plants have been found both in the wild and in cultivation. Plants found in the wild have sometimes been maintained in cultivation by several generations of the same family as a living heirloom. Until relatively recently little breeding has been carried out on the yellows and they were most commonly propagated vegetatively. As this is a slow process yellow Clivias remained rare, and if they became available for sale they often fetched high prices, especially in the USA and Japan.

While there is the suggestion that two distinct forms of yellow Clivia exist, with different breeding systems, the most commonly available yellows will produce 100% yellow offspring if crossed together. If crossed with an orange or red the offspring are 100% orange or salmon. If individuals in the F_1 population are sib-crossed approximately 25% of the F_2 population will be yellow/cream. If individuals are backcrossed to a yellow approximately 50% will be yellow. This all clearly points to a single or the same mutation. As forms with broader leaves and larger flowers have resulted from one and a half centuries of breeding orange and red forms there is a lot of merit in following this route of development.



Commercial production of yellow-flowered *C. miniata* at Cape Seed and Bulb in South Africa.

Variegation of the leaves occurs in some seed lines and superior clones with stable aesthetically pleasing variegation have been established, although these remain rare. In addition to longitudinal variegation the Akebono form, where variegation is horizontal, has been developed in Japan. The development of this form of variegation appears to be temperature related.

Clivia gardenii

The pendulous species of *Clivia* are not widely grown in comparison with *C. miniata*. *C. gardenii* is grown in frost-free areas where it can be naturalized under trees. It is a relatively variable species in nature and only a few accessions have been widely introduced to cultivation. The species is most easily recognized by the fact that it flowers during the winter, whereas the other species flower in succession from early spring to early summer. The most commonly encountered form of *C. gardenii* has lax leaves with a pronounced central groove and sharply pointed leaf tips. Good diagnostic features are that the undersides of the leaves tend to be a pale whitish green, and both the stigma and stamens protrude well clear of the flower tubes, unlike the other pendulous species. The flowers are somewhat curved and are pale orange, sometimes near yellow, tipped with green.

C. nobilis

Although gardening books have tended to identify any pendulous *Clivia* as *C. nobilis* it is in fact rare in collections. Almost invariably plants claimed to be *C. nobilis* turn out to be *C. gardenii*.

The species is easily recognized, as the leaves are stiff with a scabrous, cutting leaf margin. The leaf tips are blunt, often with a concave indentation [retuse – emarginate]. Plants are very slow to establish from seed and even when mature they flower only erratically. Inflorescences contain more flowers than other species. Accessions vary in flower colour and, in my experience, coastal accessions

tend to be red while those from further inland tend more to pink.

The identification of plants as *C. nobilis* is further complicated as a hybrid between *C. nobilis* and *C. miniata* was created in Belgium in the second half of the nineteenth century. This was styled *C. cyrtanthiflora* and has been vegetatively propagated; quite large plantings are found in some Australian Botanic Gardens. Leaves, even on the same plant, can vary markedly with some closely resembling leaves of *C. nobilis*. However, flowers are flared and are much less pendulous than those of *C. nobilis*. It is likely that seedlings have been produced from this F₁ hybrid, which exhibit combinations of characteristics that make them difficult to assign to either parental species.

C. caulescens

Mature stands of *C. caulescens* in the wild are perhaps the most spectacular of the genus, not for floral display, but for their very long sinuous stems. These can reach several metres in length and trail over rock outcrops. This species is now finding its way into collections. It is a robust species, which establishes itself quite quickly.

C. mirabilis

This species is currently known only to its discoverers and is barely into cultivation. "It is apparently confined to the Oorlogskloof Nature Reserve in Northern Cape where small groups



Pendulous species from opposite ends of *Clivia*'s geographic range. *C. caulescens* (left) and *C. nobilis* (right).

of plants grow rooted in humus between cracks in the sandstone talus of the rock scree". The plant has an extensive root system that is large in relation to its aerial parts. This appears to be an adaptation to its habitat. *C. mirabilis* has pendulous flowers that are most likely pollinated by sunbirds, although there is a good likelihood that the plant is self-pollinating.



The swamp clivia growing in a stream at Umtamzuna, South Africa. Such plants can reach nearly 2 m in height and can develop a distinct stem.

The fact that the plant is reported to be able to bear full sun will be of interest to gardeners and plant breeders and it will be interesting to discover whether it is able also to grow in shade. With the current interest in the genus it is very important that wild populations of this newly discovered plant are protected.

Swamp Clivia

Over time different pieces of information in addition to plant shape have been taken into consideration when delineating a species. For instance chromosome numbers and biochemical data have been used for various genera. Increasingly DNA data are being used.

Recently Dr Yidong Ran completed a cytogenetic analysis of the genus *Clivia* as a PhD. study here in Auckland, jointly supervised by

Professor Brian Murray and myself. As shown in our scientific paper (Ran *et al.* 1999) it is possible to identify the different named species of *Clivia* on the basis of banding patterns that develop when the chromosomes are stained in various ways.

In my collection were some plants originally given to me as seed by Graham Duncan at Kirstenbosch in 1994. These plants were referred to as a robust form of *C. gardenii*. Initially the seedlings looked pretty much like those of any other *Clivia* except *C. nobilis*, but as they became older the plants stood out from anything else. They were very vigorous and with a tall stiff habit and rounded leaf tips quite distinct from the very pointed lax leaves of *C. gardenii*, although they did have the pale green almost white lower leaf surface that one associates with *C. gardenii*.

When Yidong looked at the chromosomes of the "Robust" *gardenii* he found that while the banding pattern was closer to *C. miniata* and *C. gardenii* than to *C. nobilis* or *C. caulescens*, it was distinct from either.

We hear much about DNA analyses and fingerprinting in connection with forensic work and criminal trials. Similar techniques are available to plant scientists and Yidong used two distinct methods, namely random amplified polymorphic DNA analysis (RAPD) and DNA sequencing. Two regions were sequenced, the internal transcribed spacers (ITS1 & ITS2) of nuclear ribosomal 45S DNA and the non-transcribed spacers between the 5S RNA genes. When these methods are combined with



F1 hybrid between *C. gardenii* and *C. miniata*. Note flared flower form and bloom angle.



F2 generation hybrid from a cross between *C. gardenii* and a yellow flowered *C. miniata*.

appropriate statistical models, it is possible to estimate how closely related different species and varieties may be. Our DNA analyses showed that Robust gardenii was distinct from the four species already named but most closely related to *C. gardenii* and *C. miniata*.

Additional collections have been made in an area between Port St Johns and Umtamvuna at Port Edward and a site in Natal. These have proven to have the same distinctive karyotype as the original accession of Robust gardenii.

Ecologically the species is very distinct from the named species of *Clivia*. It is found in patches of *Syzgium* forest that occur in grassland. These are situated in depressions that fill with water during summer. It also occurs along river banks and small streams. The other species are almost invariably found associated with rock outcrops on well-drained soil. Flowering takes place in June and July in South Africa but occurs in April and May here in New Zealand. The flowers are pendulous, tubular and orange-red, and the inflorescences tend to have relatively few flowers. In contrast to *C. gardenii* the stigma and stamens are retained within the flower tube, barely protruding at most.

With all the species it is important to realise that different populations of a species growing in the wild will vary from each other. The longer populations are separated from each other the greater the differences; eventually the differences may be so great that they are considered to be

different species. All too often plants in cultivation have all been derived from a single collection or accession.

Interspecific Hybrids

Despite the production of *C. cyrtanthiflora* a century and a half ago very little further interest seems to have been taken in crossing the other species until relatively recently. Probably because *C. miniata* has the showiest flowers it has attracted the most attention from breeders. Indeed the so-called Belgium Hybrids are intra-specific hybrids between variants of *C. miniata*. There appear to be no breeding barriers between *Clivia* species and crosses have now been produced between all the previously known species in every permutation. Many hybrids are primary hybrids at the F1 stage, but breeders in South Africa and Japan are now flowering plants of more advanced generations.

Primary hybrids between the pendulous species and *C. miniata* tend to exhibit characteristics which are intermediate between the parents. Typically flowers tend to be flared and born at "half mast" in the inflorescences. The use of winter flowering *C. gardenii* has the potential to greatly extend the flowering season, while *C. caulescens* and the swamp *Clivia* are producing seedlings of considerable vigour.

The combination *C. gardenii* x *C. caulescens* has produced populations that have grown quickly and have demonstrated an ability to naturalise, readily suppressing competing weeds. Flowers are produced over an extended season and it is common to have flowers and fruit at all stages of development in a planting. It is possible that such hybrids have potential for the florist trade, where both foliage and fruits are currently in demand in addition to flowers.

Considerable scope exists to develop quite new forms of *Clivia* by sib-crossing, backcrossing and further out-crossing. Already hybrids exist which have input from three and four species.

Propagation

Clivia plants are most commonly propagated from seed. Mature plants produce additional shoots from below soil level and these can be removed and potted individually. Different plants vary considerably in their propensity to produce side shoots. Because *Clivias* are slow growing, named clones produced by division are relatively uncommon; the original 'van Houtte' form of *C. cyrtanthiflora* and the *C.*

miniata yellows 'Vico Yellow' and 'Sir John Thouron' are examples.

Clivias can be propagated by tissue culture, but cultures are difficult to establish from somatic tissue despite extensive research in various countries. Growth in culture is slow and the explants are small compared to seedlings, where the residual seed provides a reservoir of food.

Summary

Clivia is a genus that is currently gaining an enthusiastic following around the world. They make an ideal house and conservatory plant in areas that experience frosts. In frost-free locations they can be naturalised to produce impressive drifts under trees where few other plants will flower. They are a surprisingly tough plant that can survive a degree of neglect both in pots and the garden. This is an important factor in determining a plant's popularity in today's fast moving world.

From a breeding point of view they are an exciting plant with enormous scope for further development both as a pot and garden plant. They also have many characteristics which could make them a good florist flower. I am confident that we are, in reality, only at the beginning of the development of a major ornamental plant.

References

Ran,Y., Murray, B.G., & Hammett, K.R.W., 1999. Karyotype analysis of the genus *Clivia* by Giemsa and flurochrome banding and *in situ* hybridization. Euphytica 106: 139 – 147.

Ran,Y., Murray, B.G., & Hammett. K.R.W., 2001. Evaluating genetic relationships between and within *Clivia* species using RAPDs. Scientia Horticulturae 90: 167 – 179

Ran,Y., Hammett. K.R.W., & Murray. B.G., 2001. Phylogenetic analysis and karyotype evolution in the genus *Clivia* (Amaryllidaceae). Annals of Botany 87: 823 – 830.

Ran,Y., Hammett. K.R.W., & Murray. B.G., 2001 Hybrid identification in *Clivia* (Amaryllidaceae).using chromosome banding and genomic *in situ* hybridization. Annals of Botany 87: 457 – 462.

Rourke, J.P., 2002. *Clivia mirabilis* (Amaryllidaceae:Haemantheae) a new species from Northern Cape, South Africa. Bothalia 32,1: 1 – 7.

Keith Hammett was born and educated in England. He emigrated to New Zealand thirty five years ago. For twenty-six years he worked as a government scientist, first as a plant pathologist, and later as a pomologist and plant



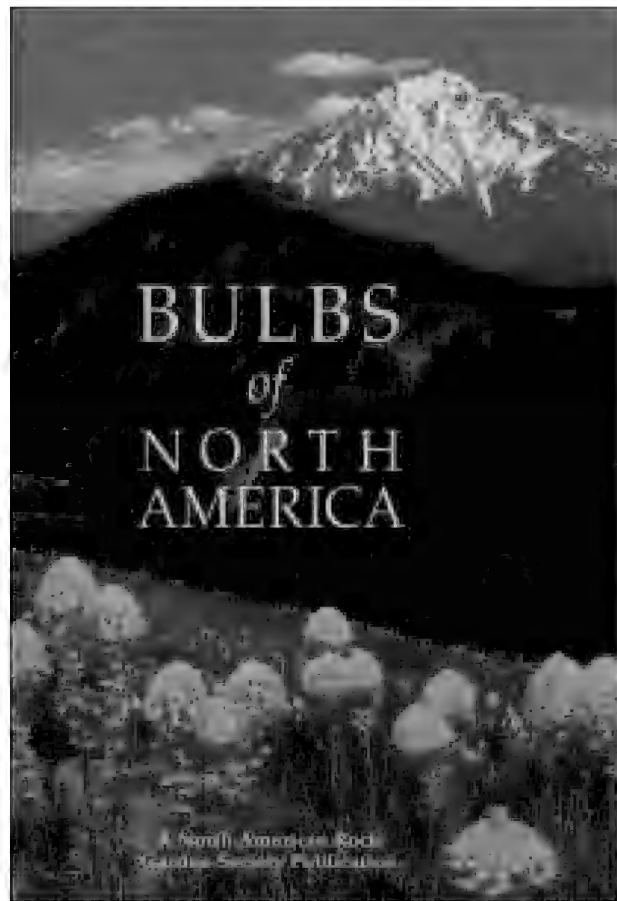
breeder. For the last nine years he has operated as a private breeder of ornamental plants and has maintained his research interests in association with several New Zealand Universities. He has worked in depth with various widely divergent genera, namely: *Clivia*, *Dahlia*, *Dianthus*, *Lathyrus*, *Nemesia* and *Primula*.

Book Reviews

Lisa Flaum

Bulbs of North America. North American Rock Garden Society, Jane McGary, Ed. Timber Press, 2001, ISBN 0-88192-511-X \$35.95 US

A six-year love affair with alliums led to a similar interest in Brodiaea. Large bulb merchants were quickly stripped of new species to try. Seed exchanges were plundered. Then came the



problem. Many of these plants had no descriptions. Where were they from? What kind of soil, water, temperature? What color, how big, invasive? At last, the North American Rock Garden Society has come to the rescue. *Bulbs of North America* is a comprehensive work on North American geophytes, edited by Jane McGary, and written by a group of experienced gardeners.

First, the scope. This book covers monocotyledonous genera, excluding trilliums and iris. Large genera or alliances (alliums, the various brodiaea relatives) have their own chapters, while smaller genera are grouped by region (Irids of the Southeast). The authors have

obviously spent a great deal of time both observing the plants in the wild, and growing them. Descriptions are detailed, and the reader should have a familiarity with botanical terms. Genera with specialized terminology have explanatory drawings. There are 101 photographs, almost all of fine quality. The cover shot, of *Xerophyllum tenax*, is breathtaking. One of the goals of this book is to enable gardeners to identify seed grown plants. While I have not yet had a chance to test this, as my North American alliums are not yet in bloom, I am very hopeful.

The variety of authors means a range of writing styles as well as different approaches to the subject. For instance, Frank Callahan, writing about *Calochortus*, is fairly specific about the locations of wild populations and his descriptions are quite detailed. This chapter is most useful to someone wishing to see and identify the plants in the wild. Alliums, written by Mark McDonough, Jim Robinett and Georgie Robinett, contains details of growing and propagating, or not propagating, as the need may be. Edward Austin McRae has had the opportunity to grow large quantities of lilies from seed and observe the variations. He also discusses hybridizing. Other authors include Michael Chelednik (Irids of the Southeast), Alan Meerow (Amaryllidaceae) and Mary Irish (Bulbs of the Southwest).

In all, this book is 11 chapters packed with knowledge, enthusiasm and experience. This is going to become one of the basics of any bulb grower's library.

Grow Nerines. Graham Duncan, Kirstenbosch Gardening Series 2002 \$10.00 US, ISBN 1-919684-33-6 Available from The Kirstenbosch Bookshop, PO Box 53445, Kenilworth 7745, South Africa

Grow Nerines, part of the Kirstenbosch Gardening Series, is a little gem of a book. Volumes in the series are intended to provide practical advice on the propagation and cultivation of South African plants, and this one does a fine job. It covers history, habitat, conservation, growth cycle, pests and diseases, and propagation, followed by descriptions of all 25 species and how to grow them. Rarely does a



page go by without a color photo, most of good quality, though a few are blurry.

Graham Duncan, a specialist in bulbous plants at Kirstenbosch, divides the species based on growth cycle: winter growing, summer growing and evergreen in cultivation. This is not a taxonomic grouping, but a convenience to the gardener. Each species then has its own section, complete with distribution, identification notes, and a solid cultivation guide. For instance, for *Nerine paniculata*, which flowers only after fire, Mr Duncan states, "Ideally, this species should be grown in terracotta pots which can be plunged to ground level and have some straw grass or twigs burnt over the top once during the winter season." Wow, a plant that requires burnt offerings to flower! It's good to know what you're up against. Most species have simpler requirements, though details such as level of moisture in the dormant season, and the need for an exceptionally deep pot, are consistently mentioned. Mr. Duncan's experience is impressive, and he leaves the reader confident that a plant's needs can be met.

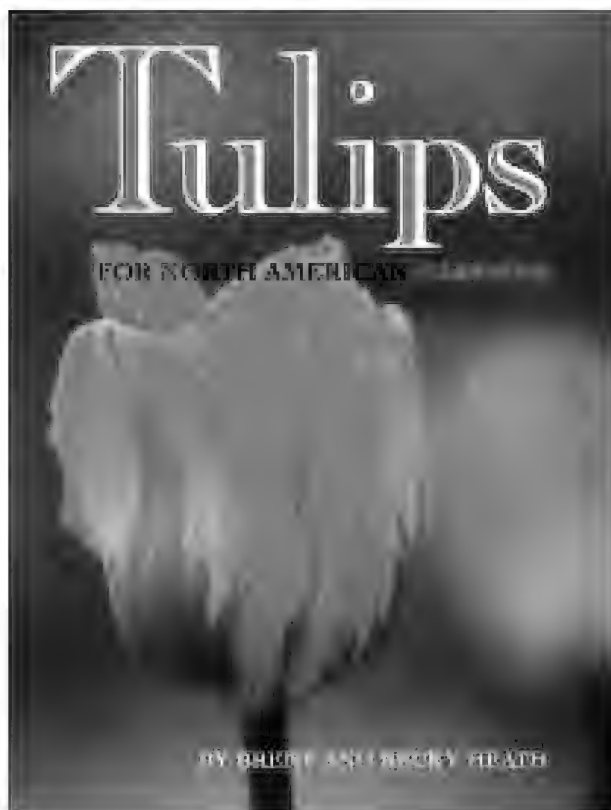
This brief book packs a tremendous wallop. If you would like to expand your Nerine collection, this book will be very helpful. If you don't yet grow any Nerines, get this book first so you'll know which species to start with.

Tulips for North American Gardens.

Brent and Becky Heath, Bright Sky Press, \$24.95 US ISBN 0-9704729-6-X

This companion volume to *Daffodils for American Gardens* is a general introduction to tulips in the garden. It covers the basics of history, description of divisions, and culture, as well as forcing and even flower arranging. I particularly liked the section on starting a spring bulb festival. There is a chapter of cultural recommendations by region, which is most useful for the novice gardener who has not yet acquired a bone-deep familiarity with her climate.

There is a large section of recommended tulips, separated by division and illustrated with generally good photographs. The strength of this book is the photos, which promote both plenty of planting ideas and a strong desire to spend the entire household budget on tulips.



Lisa Flaum lives outside of Waterloo, IL, with her husband, children, dogs, cats, and assorted plant-eating wildlife. Present enthusiasms include Crocus, Allium, Crinum and Zephyranthes, as well as many perennials. A 3 acre garden provides lots of room to experiment.

Stutterheim's *Grandiflora* Moraeas

Rhoda McMaster

Photographs by the author except where noted

The northern end of the Amatola Mountains (alt. 1200-2000 m) is like a garden wall to one side of Stutterheim (alt. 850-950 m), easily accessible for a hike of anything from an hour to a full day, and a place to revive your soul. The indigenous forests are magical, and the montane grassland above them a treasure trove of a great many plant species.



From early spring to late autumn there are usually some large yellow *Moraea* flowers to be seen, any one of five species depending on the season - *M. huttonii*, *muddii*, *spathulata*, *graminicola* and *reticulata*. They belong to the *Moraea* subgenus *Grandiflora*, which includes 15 species (Goldblatt 1986) mostly with large yellow flowers, from the summer rainfall region. The subgenus *Grandiflora* is characterized by having a single leaf, usually channelled, fairly leathery and often very long. They are mostly evergreen, but *M. muddii* and *M. graminicola* are deciduous. The flowers are more long-lived than those in the Western Cape, often up to three days, and flowering takes place over a number of weeks as many flowers are produced from the single stem.

Moraea is an African genus found south of the Sahara, with a concentration in the Western Cape where they are winter growing, mostly with colourful flowers. The spelling is easier to remember if you know the name *Moraea* commemorates Dr. Moraeus, the father-in-law of Linnaeus – all three names contain 'ae'! There

is a cluster of the summer growing yellow *Grandiflora* group in the highland areas of the Eastern Cape, mostly at altitudes ranging from 1000-2500 metres. For an excellent overview of the climatic conditions, see BULBS vol. 2 no. 3, pages 9-10.

There are several common names for *Moraea* in South Africa. 'Peacock Flower' refers mainly to the Western Cape ones with 'eyes' on the tepals, while the yellows are often referred to as 'flappies' when the connotation is 'iris-like'. 'Uintjie' is for the edible ones especially of the Western Cape, and 'tulp' for those poisonous to stock. The *Grandiflora* group is mostly poisonous to stock and so should not be planted where grazing animals could get to them. However, Pearse (1978), reports that moles and porcupines seem to be immune to the poison, and the plant called 'ihlamvu elincane' (*M. spathulata*) is used as a traditional medicinal remedy for women who fail to conceive. One corm is ground up and mixed with some maize, and three small cakes are made, of which two are for the woman to eat and one for the man. "It isn't long before the patter of little feet is heard!" It never fails to amaze me how many



Moraea huttonii.



Moraea muddii.

poisonous bulbous plants are used in traditional medicine – the topic for another article!

For us mere mortals who are not botanists and who need to distinguish between the five species, the simpler characteristics to look for are in the combination of: flowering time, (un)branched stem, clump-forming or solitary plants, leaf width, and for final confirmation if necessary, tepal shape and colouring.

Description of the species

The first flowers to be seen in early spring are of *M. huttonii*, most often growing in prolific clumps on the banks of mountain streams. An earlier rather apt name for this species in KwaZulu-Natal was *M. rivularis*. When it was first described by Baker in 1875, it was named *Dietes huttonii*, because the plants sent to Kew (by Henry Hutton) seemed to him to have a woody rootstock. What a pity the 'rivularis' name wasn't first. The plants occur in a broad band from the Amatola Mountains in the south, along the Drakensberg Mountains and into southern Mpumalanga.

It is easy to distinguish *M. huttonii* from the others by the branched stem, often hidden in the sheathing bracts. The other four species have unbranched stems. The flowering stem is about 80 cm tall and the leaf, up to 2.5 cm wide, can reach 150 cm in length. The scented flowers are a clear bright yellow with yellow-brown nectar guides that are edged with darker veins on the outer tepals, which are up to 5.5 cm long. A constant succession of flowers ensures a bright

show for many weeks when the surroundings are often still clad in shades of brown from the dry winter cold.

From the end of September to October, the locally rare *M. muddii* can occasionally be seen. There are unfortunately some stray cattle that like eating off the flowers, so seeds are scarce. And then when seed does get a chance to form, the porcupines ignore the tops and go for the corms, despite the name *muddii* ! It appears that the plants are much less toxic later in the growing season. The name is in honour of Christopher Mudd who collected plants in 1877.

M. muddii occurs in the higher grassland parts of the Amatola Mountains, and then there is a puzzling gap until it is again found in the northern parts of KwaZulu-Natal and up into Mozambique and eastern Zimbabwe. It is smaller than the other four species, being seldom taller than 40 cm, does not form clumps and has a narrow leaf 3-6 cm wide, so channelled that it appears cylindrical. The flowers are pale yellow marked with darker yellow nectar guides and a few darker veins on the outer tepals, which are up to 5 cm long.

M. spathulata is very sparsely distributed here, but in the Drakensberg, Pearse (1978) notes "it is not unusual to find great masses of yellow colour against the dark grey of the basalt". They occur from the edge of the winter rainfall area near Port Elizabeth all the way up the eastern parts of South Africa, and far into Mozambique and eastern Zimbabwe, at altitudes ranging from low coastal regions to mountains over 2000 m. The flowers appear at different times of the year, depending on the locality. In the south with some winter rain, or along the coast where there is no frost, flowering can be any time during winter and spring. Here in the mountain grasslands of the Stutterheim district, it flowers around October and November and in the Drakensberg in midsummer. Further north the flowers appear in late summer. A variable and adaptable species indeed!

The inner tepals are spatula-shaped - broadest towards the ends - hence the name *M. spathulata*. It has also been known under the names *Iris spathulata* (when first described by Linnaeus the younger in 1782), *Iris spathacea*, and *M. spathacea*. *M. longispatha*, described by Klatt in 1866, now also falls under *M. spathulata*.

The plants of *M. spathulata* are usually in clumps, about 80 cm tall, each plant having a very long leaf 1.5+ cm wide and easily up to 2



Moraea spathulata. Tony Palmer

m, or even longer in cultivation. The leaf is persistent, i.e. the same leaf continues to grow each season, with the end drying off. These long tough leaves are used by the local people to make rope, and the corms for the traditional remedy mentioned above. The flowers are a good yellow with deep yellow nectar guides on the outer tepals, which are up to 5 cm long.

As the season progresses, the next to be seen around here is *M. graminicola* subsp. *notata*, flowering in a few localities from November to January. According to Goldblatt (1986) the distribution is “along the coast and near interior Transkei between Port St Johns in the north and East London in the south”. The specimens we have found in the Amatola Mountains are therefore an extension of the range by about 100 km, and at higher altitudes – to about 1600 m. ‘Graminicola’ refers to the grassland habitat, and ‘notata’ means ‘southern’ – the more northerly species in Kwazulu-Natal is *M. graminicola* subsp. *graminicola*. Apart from the north-south division, the main differences between the two subspecies are: 3 sheathing bracts and dark blotches at the base of the crests in subsp. *notata*, and only 1-2 sheathing bracts and no blotches on the crests in subsp. *graminicola*.

M. graminicola subsp. *notata* flowers are dramatic, having unusual grey-yellow tones with deep yellow nectar guides surrounded by a dark mauve band from which mauve veins radiate out. These outer tepals are about 7 cm long. The leaf is stiff and relatively broad, usually about 1 cm wide and 50 cm long. The tip is folded into a point. Obermeyer (1968) notes that a new leaf is formed each year, in contrast to the persistent leaf of *M. spathulata*. Apparently there

may be branching in the stem, but it is rare – we haven’t seen branching yet. The plants are up to 60 cm tall. The outer tepals are about 7 cm long.

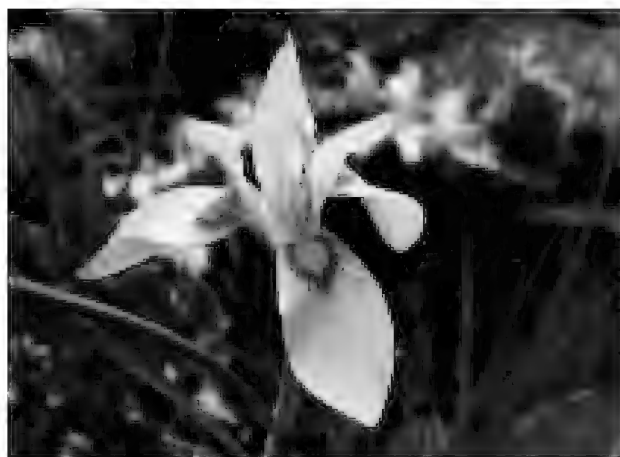
The last to flower is *M. reticulata*, from February to May. The name is derived from the fibrous network (reticulate) like a fishnet enclosing the base of the stem and bracts for 10-20 cm. It is separated from *M. spathulata* by its solitary habit (not clump-forming as in the latter), by the pronounced fibrous network (sometimes there is a weakly developed network in *M. spathulata*), and by the different flowering time in this region. *M. reticulata* occurs only here, from Bedford to Queenstown on steep grassy slopes, with the Amatola Mountains as its centre point. It seems to have been missed by early collectors – it was only described in 1973.

M. reticulata is about 60 cm tall, with a long leaf, 1.5+ m in length and 1.5 cm wide. The flowers are bright yellow with orange nectar guides and a few darker veins on the outer tepals, which are about 7 cm long.

In the garden

I would classify these *Moraea* species as easy-care, low maintenance garden plants. The flowers are always beautiful and eye-catching, and the extra long leaves of some species are a curiosity. Jim Shields will hopefully give us information some time in the future about the extent of their cold-hardiness. They survive in our garden with -5C during some winter nights, and like to remain undisturbed for a number of years.

They are planted in the same general soil mix we use for most of our bulbs – a mixture of good loam, a bit of milled composted pine bark, well-matured garden compost and a bit of coarse



Moraea graminicola.



Moraea reticulata.

river sand. To this we add general fertilizer (2:3:2) and bone meal. The main soil requirement for these plants is excellent drainage so most are grown in slightly raised beds. We have almost dry winters, with good rains in summer, about 900 mm per year. They like full sun and breezy conditions. Although in nature

M. huttonii grows on stream banks in full sun, in our garden they are not given any more water than the other species (all rely on natural rainfall) and thrive in semi-shade. I doubt that they would grow well in a greenhouse – any comments from the readers?

If they are to be grown in containers, these species will need to be in 25-35 cm pots, the larger size especially for the clump-forming ones. Remember to keep the containers cool by shading them from the sun – in nature the corms are in permanently cool to cold mountain soil. They need to be well watered from spring to autumn, and not allowed to dry out in winter.

Seeds germinate readily, any time from spring to late summer. Seedlings stay evergreen during their first year or two (in a seed tray out of the frost), and in the garden thereafter they are usually evergreen except for *M. graminicola* and *M. muddii*, which are deciduous.

They don't seem to be particularly susceptible to pests and diseases – so far we haven't needed to treat them for any ailments.

A quick guide to the Stutterheim yellow *Moraea* species

Moraea	flower time	solitary plant	branched stem	leaf width	other features
<i>huttonii</i>	Aug – Sep	clump forming	mostly branched	10-25 mm	stream banks
<i>muddii</i>	Sep – Oct	yes	no	3-6 mm	40 cm tall rare
<i>spathulata</i>	Oct – Nov	clump forming	no	1.5 cm (w) 2+ m long	rare
<i>graminicola</i> <i>subsp. notata</i>	Nov – Jan	yes	very rarely	10-12 mm	Greyish flw rare
<i>reticulata</i>	Feb - May	yes, with basal net	no	1.5 cm (w) 2+ m long	Mt slopes, endemic

References

Goldblatt, Dr P. 1986. *The Moraeas of Southern Africa*. Annals of KIRSTENBOSCH Botanic Gardens, Vol. 14.

Obermeyer, A. A. 1968. *Moraea graminicola* in *Flowering Plants of Africa*, Vol. 39, parts 1 & 2. Botanical Research Institute, Pretoria.

Obermeyer, A. A. 1970. *Moraea huttonii* in *Flowering Plants of Africa*, Vol. 40, parts 3 & 4. Botanical Research Institute, Pretoria.

Pearse, R. O. 1976. *Mountain Splendour*. Howard Timmins, Cape Town.

Pooley, E. 1998. *Wild Flowers of KwaZulu-Natal and the Eastern Region*. Natal Flora Publications Trust, Durban.

Saunders, R. and R. 2000. *Bulbs of Southern Africa* in *BULBS*, Vol. 2 No 3, IBS Quarterly.

Switching Hemispheres:

How to change a bulb from one hemisphere to another

Mary Sue Ittner

It is sometimes possible to obtain bulbs (used in this article to include all geophytes) that have been growing in another hemisphere. There is very little written about what to do to get them growing at the correct time. IBS Internet forum members have shared their formulas for success over a three-year period and this article will summarize the strategies different members have found that either worked or didn't work for them.

What to do often depends on what you are converting. Some bulbs replace themselves each year. This is true of most corms. If their growing season is limited, they may only last the first season or be smaller at the end of their growing period than when they were planted. It may be a few seasons before they bloom again. Therefore keeping them growing as long as possible is essential. This can be achieved by prolonging dormancy so they can be planted closer to a time when conditions are to their liking, or by planting them immediately and boosting the growing conditions by altering the temperatures, providing more fertilizer, etc.

If the bulb will not be replacing itself as is the case for many true bulbs, it may be able to tolerate interruptions more easily, but still may be unhappy with certain temperatures and not grow roots.

It is helpful to know what conditions the bulb requires, including information about habitat and climatic conditions. For instance, does it need a warm dormancy or an extended cool period for roots to form? What to do will be decided by what you know about its needs, as well as by what conditions you are able to provide.

Experience has shown that potting up when the bulb is received and giving it no special treatment has often resulted in losses. Winter growing bulbs planted right away in spring instead of fall, may cease growth when it gets hot and before roots are formed or new corms produced. Continued watering under those conditions may just ensure the bulb or corm will

rot. If, on the other hand, the bulb is very small and is held to plant at a later date, it may shrivel during dry storage and never come up at all. People who can provide cool temperatures in summer for winter growing bulbs that are being converted have a definite advantage.

It appears that growing in a container or, if you have the luxury and space, a large crate, is essential. This way you can control the temperature, amount of moisture, ventilation, light, etc. that you cannot so easily control if you plant in the ground. If it will be necessary for the bulb to be growing in a warmer time of the year than usual, using a fungicide will give added protection. Most people recommended growing in a container at least through a second season before planting out. Bulbs being grown in temperatures higher than they might want were usually grown in the shade.

Some of the points listed above also apply to short-lived seeds obtained from another hemisphere, as it is important to keep seedlings growing for a long enough time for them to grow big enough to survive their first dormancy.

Below I have summarized the experiences the members shared about the different bulbs they attempted to convert.

Narcissus

Many members converted this genus successfully both in the Southern and Northern Hemispheres. Steve Vinisky in Oregon, found that it was best to try to expedite when you got them so they could be started in late winter rather than spring, to extend the cool growing season. This also avoided summer blooming when heat would stress the plants and there would be more possibilities of rot. Bill Dijk in New Zealand found that he could rarely get bulbs that early, so advised potting in deep crates with good ventilation, watering, and placing the crate in cool storage, sometimes for several months or until shoots were well up. This promoted the development of good roots. When moved outside, the bulbs were grown in shady cool places.

Kirby Fong from Northern California, who received bulbs in late winter and spring, planted his right away or stored them in a refrigerator. He used a deep pulp pot, a pinch of superphosphate in the lower part of a mix that would drain very freely, and placed the bulbs on a layer of bulb dust before adding more of the mix and bulb fertilizer. He watered frequently with cold water to keep them cool. If bulbs arrived later in spring he would plant them, water them, and place them in the refrigerator, noting that in nature they would be making roots in the cool, damp winter. If no foliage appeared, watering was stopped. Water was withheld as the foliage dried some time in summer. Bulbs were smaller after this treatment and could skip the next blooming season, but often came back into growth a bit earlier or at the right time.

Narcissus in the bulbocodium group that begin growth in fall and bloom early winter were given to the bulb exchange in spring. Jim Waddick from Missouri gave them a short dry summer baking after starting them right away, and even got them to bloom the following winter at about the right time. Lee Poulsen from Southern California found his never went completely dormant when grown in a cool part of his garden, so he continued to water them. They bloomed the following winter. Arnold Trachtenberg in New Jersey grew his in a cool basement under lights, moving them outside to a shady spot when they were in growth. They bloomed briefly, were fed regularly and in spite of being grown in a small container all seemed healthy (and some had offsets) when he checked them at dormancy. Dell Sherk in Pennsylvania found his did not completely go dormant in spite of two months of withholding water in the summer. They too went on to bloom. How they all fared in later years is not known, except Dell reported his had not bloomed again and were dwindling.

Narcissus species I received in Northern California in spring and summer have all survived, but most have not bloomed even several seasons later. Interestingly the only two of the bulbocodiums that I have gotten to bloom again were the only two that bloomed that first summer following the spring planting, *Narcissus bulbocodium* var. *monophyllus* and *Narcissus romieuxii* var. *zaianicus*. Whether they are still adjusting or just not happy in my climate I do not know.

Fritillaries and Iris

Bill Dijk reported good success with *Fritillaria* species and reticulata irises using the same method he did with *Narcissus*. He planted in spring in a deep crate, watered, and put them in cool storage for two months before moving them to the coolest spot in the garden once in growth. Jim Waddick kept Siberian iris as cool as possible in spring to early summer, before withholding water for a short summer so they would naturally go dormant in the fall. Lee Poulsen told of a friend who forgot some bearded iris for a year where they were kept moderately cool, dry, and dark, and they all grew once planted and bloomed. This implied that they could be converted relatively easily by prolonging dormancy and starting them back into growth at the correct time.

South African winter-growing and summer-growing irids

This group was one of the more difficult to convert. Since many of them can be grown from seed to flowering in a number of years, raising from seed may be a more efficient way to grow them. Having a cool climate in summer is a definite advantage as plants can be kept in growth longer and more of them will survive. They will still need a warm dormancy later, so will take a few years to get back in sync however.

In climates where temperatures get hot in late spring/early summer, planting in spring did not give most of them a long enough time to grow and produce a new corm before hot temperatures set in and growth halted. Lauw de Jager in France reported only 30% survived and these were small. Leaving them unwatered in sand and planting in fall improved the survival rate to 50%. Jana Ulmer tried keeping a couple of species cool and dry in the refrigerator to prolong dormancy and planted them late summer. This was not clearly helpful although the sample was very small, as were the corms. Two of us with cool summer temperatures, Diana Chapman and I, were able to extend dormancy by storing corms dry in paper bags, and then planting at the right time in early fall. This seemed to work, but probably would only work if the corms were big enough to survive being dormant for an extended period and the temperatures were not too hot. Having cool summers I was able to plant *Ixia paniculata* in spring and keep it growing, but the following year it did not

emerge until mid winter, whereas *Moraea tripetala* kept dry until fall planting, emerged at the normal time.

Jim Shields in Indiana tried to convert summer-growing irids. They arrived in spring and were potted up, but not watered, kept in shade and somewhat protected from the elements until in growth. Once in growth they were given more light, but still not a lot of water. He lost some of the things he tried, but had success with two *Moraea* species, *Moraea huttonii* and *Moraea spathulata*. The former grows in a semi-aquatic habitat and might be expected to be easier to plant right away.

South African winter-growing amaryllids

Tom Glavich in Southern California was able to arrange to have these sent so they would arrive in mid fall. They were potted immediately and left outside unless there was an extended period of rain (unusual in Southern California). When there were signs of growth, they were watered, and they were dried off when growth stopped. If leaves were green, but growth was slow they were still given a good soaking occasionally. It usually took a couple of cycles for them to be growing in the proper season. He watched the growth and let the bulbs take the lead.

Diana Chapman reported losses of about 50% when bulbs arrived in late spring, were watered once after potting, placed in the shade and watered when they started growing. If they were able to produce adequate roots before temperatures stopped growth they survived, otherwise not.

Mike Mace in Northern California had tried storing bulbs dry as well as planting and hoping they would adjust. What he found to work better was putting them in a closed plastic bag, with a paper towel to absorb moisture, and placing them on the top shelf of the refrigerator. He checked them monthly for disease or signs of growth and then planted in late summer. Following this advice Jana Ulmer had success with 8 out of 10 *brunsvigias*.

Forum members had always been advised to plant amaryllid seed immediately and then try to keep it going for as long as possible. If it could be in growth for a year, it would then go dormant at the correct time. Andrew Wilson in

Southern California found that it was difficult to keep the seed growing in the warm summer months. So he experimented with putting seed in closed plastic bags in the vegetable tray when he received them in early summer. In fall he found they had all sprouted and were easily planted. His best results were with *Haemanthus* and *Brunsvigia* seeds, which were large and fleshy. *Gethyllis* seed that was smaller and drier became desiccated, and he concluded might need more packing or to be planted sooner.

South African summer growing amaryllids

Jim Shields tried these as well. *Nerines* arriving spring to summer were planted and watered if they had foliage. Otherwise they were kept dry until in growth. All were kept out of the sun. They all produced new foliage and *Nerine flexuosa* bloomed in winter. *Crinums* arriving in summer were planted and placed outside. All were large bulbs and started growing at different times. Some even bloomed that first summer.

Oxalis

Diana Chapman reported that winter growing *Oxalis* from South Africa, arriving in late winter to early spring, could be started into growth fairly quickly. Although the new bulbs produced were small, they could be replanted after a short summer dormancy and be on track rather quickly. She speculated that in a climate like hers where they were almost evergreen, South American *Oxalis* would show little setback when changing hemispheres.

Nothoscordums/Ipheions

Ipheion uniflorum cultivars that I received in spring and planted immediately, came up quickly, grew, and bloomed in a few months. After a short dormancy, they bloomed the following winter-spring without any apparent setback at all, and have continued to thrive. They are very adaptable plants in my climate, surviving with or without summer water, and that may be why they were so easy to change over.

Nothoscordum sellowianum (*Ipheion sellowianum*) and *N. dialystemon* (*I. dialystemon*) gifts from Bill Dijk in New Zealand, arrived in the Northern Hemisphere in late winter. Diana Chapman advised to treat them with fungicide, plant them immediately, and try to keep them growing as long as possible by



Nothoscordum sellowianum (Ipheion sellowianum). Tony Palmer

providing regular fertilizer and cool temperatures. Where late spring and summer night-time temperatures were high, she suggested putting them in the refrigerator each night. Once they started to show signs of the leaves drying up, watering was to be reduced, but not stopped. Warmer temperatures were then to be provided if possible for about a four month dormancy, before moving them to a cooler spot and resuming regular watering.

This was a successful strategy for many of us. Lee Poulsen waited until fall to plant and found most of the bulbs had shriveled and did not recover. Marguerite English had blooms in one species the following winter. Most of mine were blooming the year after. Smaller bulbs of *N. dialystemon* received from another source did not break dormancy the next season, after growing initially, but after being given a warm summer in my greenhouse at Diana's suggestion (as they would have in South America where they grow) they came up the following year and bloomed.

Sandersonia aurantiaca

This one was quite easy for me to turn around. It arrived late summer, was potted right away, but moved inside in order to provide warmer temperatures. It bloomed in November. Given a short dry dormancy afterwards, it bloomed at the normal time the following summer and has continued to be on track. Cut flower growers have found that it can be manipulated to flower at different times of the year, which makes it a good candidate for changing hemispheres.

Lachenalia

There were only two reports. Bulbs received by Diana Chapman in spring were inadvertently buried in a pile of papers in a crumpled paper bag in temperatures not usually greater than 65 ° F. (18 ° C.). They had shoots in fall when discovered, and were doing fine once planted. The one species that Jana Ulmer placed dry in a plastic bag and refrigerated until fall grew briefly when planted before disappearing.

Leucocoryne

Leucocoryne purpurea and *L. coquimbensis*, also gifts from Bill Dijk to the BX, arrived in summer, 1999. It was suggested that these would benefit from cool storage so they were planted right away and placed in the refrigerator. Instead of delaying growth, the cool temperatures seemed to encourage them into growth. They came up quickly and were therefore growing in the middle of the summer. They didn't stay in growth very long, did not bloom, and were dormant in the fall. When to start them back into growth was a puzzle, but an article in *Herbertia* indicated they needed extended warm temperatures in dormancy to bloom properly. Therefore I kept mine dry for almost a year, first in moderate temperatures, and then in warmer temperatures. Planted the following fall, they were back on schedule and bloomed the following spring (2001). On the other hand, Jana Ulmer gave hers a short dormancy and they too survived and are now blooming for the first time in 2002.

Terrestrial orchids

Finally, Malcolm Thomas of Australia reported that terrestrial orchids he sent to the northern hemisphere, packaged in small sealed

bags with a little dry vermiculite, were returned unclaimed four months later. Unable to plant them as he was leaving on a long trip, he stored them in the refrigerator for three months. Many of them had started to shoot in the cool, and seven of eight potted up after seven months in storage were growing on a northern hemisphere schedule, now back home in the southern hemisphere!

In conclusion

There were more successes than failures getting bulbs to survive switching hemispheres. Some things were turned around in one season and even bloomed at the expected time. Others did not bloom for several years as they adjusted. Others grew the first year, but I do not have data on how they did in future years. Obtaining plants from your own hemisphere would still seem to be the easiest approach. Growing from seed, especially when it only takes a few years for flowering, may be almost as quick and less trouble. If, however, there are very special plants that may not be easily obtained otherwise, it is possible that by studying their needs and analyzing how you can meet them, they can eventually be turned around.



Leucocoryne coquimbensis. Bill Dijk

A Sneak Preview . . .

Just to whet your appetite a little, here is a taste of some of what you can look forward to in the next issue of BULBS.

Don Journet will be waxing lyrical about *Lachenalias*, those charming little South African bulbs that are generally quite amenable to cultivation. Don is one of our Australian members and lives about 32 miles (50km) west of Melbourne at the base of the Great Dividing Range. He has grown up to 90 different species, hybrids, cultivars and varieties. He will describe some of them and also give us useful information on their cultivation. Just as an example of how rewarding they can be he records *Lachenalia reflexa* as having flowered for a period of 16 - 17 weeks.

Mark McDonough recounts his unfolding adventure with *Allium flavum* subsp. *tauricum* which he started growing in the mid 1980s. From several different colour forms he has now ended up with what he describes as a remarkable palette of colours. He firmly believes that almost any colour is now possible, to add to an equally astonishing range of floral and foliar characteristics. You will believe it as well when you see his beautiful photos that richly illustrate the article.



***Allium flavum* subsp. *tauricum* - unnamed pink form.** Mark McDonough

Back to South African bulbs and Robin Attrill from the UK will beguile you with his feature article on *Romuleas*. Robin is originally from the Isle of Wight, but now gardens in Essex. He hopes that the day will come when *Romulea*, with its remarkable range of flower colour, is regarded as being on a par with *Crocus* which, as he points out, are not without their weedy species as well..



Romulea tabularis. Tony Palmer

In addition Roy Sachs will hopefully shed some light on viruses and the nasties that help to spread them around. Lisa Flaum reviews John Bryan's latest addition to the libraries of the lucky ones and Dirk Wallace smokes a variety of seeds, but swears that he doesn't inhale! Rachel Saunders pulls together people's experiences with growing bulbs in raised beds and last but not least I hope to finally have something on regulations around the world for seed/bulb imports. We will find out whether the new ones in the US are an over-hyped fizzier, or a serious impediment to your enjoyment of our great hobby. Other bits and pieces you'll have to wait to find out about when you receive your copy.

Hope it all adds up to a great reason to renew your sub!

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BULBS

Bulletin of the International Bulb Society



Volume 4 No. 2

July - December 2002

Price \$5.00

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COVER PHOTO
Hymenocallis coronaria by Beth Young

First Words

Tony Palmer – Editor

My apologies for being late again. Just when I thought that everything was going smoothly we lost Eric Watts, our layout person. We are hopefully back on track again with Carol Longley of Longley Printing, also here in Auckland which makes it easier for me to communicate with her. I am working simultaneously on Volume 5 No.1 so that we can publish that on time. Once we have caught up it will be much easier to get our publication out promptly from then on, which will give our advertisers greater confidence and will mean that topical news and announcements will not be hopelessly out of date.

Certainly lack of copy has not been a reason for our tardiness. Little in the way of arm-twisting has been needed to persuade authors to produce a wide range of excellent articles on their favourite topics. In this issue we join John Bryan on his travels to Holland and England, in particular his visit to Keukenhof Gardens with their unparalleled displays of bulbs. We sweat with David Fenwick as he builds a South African garden in Barbados of all places. Mark McDonough dazzles us with the seemingly endless colour variations he has produced from *Allium flavum* subsp. *tauricum*. A persuasive argument for the horticultural merits of romuleas is presented by Robin Attrill from the UK and Kevin Preuss waxes lyrical on spider lilies, which have become one of his major passions. *Hymenocallis coronaria* growing in its natural habitat adorns our front cover. This picture was taken by Beth Maynor Young, who kindly gave us permission to use it. I was really blown away when I first saw it, as I had never seen a photo of these beautiful lilies in the wild and I had no idea of how or where they grow. It is certainly magical. I highly recommend a visit to Beth Young's website at <http://www.cahabariverpublishing.com/>

As usual we have several shorter articles as well. Dirk Wallace writes on using smoke to enhance seed germination and Rachel Saunders has assembled the experiences of a number of people growing bulbs in raised beds. I'm still a little unclear as to just what effect the seemingly draconian legislation requiring a phytosanitary certificate for all seeds imported into the United States has had. Anecdotal evidence would suggest that maybe it has not been as dramatic or negative as many

people feared and that moves are afoot to make the law more sensible. In this issue Bill Richardson (Australia) and Rachel Saunders (South Africa) tell us what the rules and regulations in their respective countries are for plant and seed imports/exports. I'd be interested to get an update on all this from someone in the US – volunteer?

Lisa Flaum continues with her book review column. In this issue she tackles John Bryan's 2nd edition of *Bulbs*, as well as *Spring Blooming Bulbs*, a Brooklyn Botanic Garden handbook, and *Growing Bulbs Indoors*, by P.J.M. Knippels.

There are a couple of topics I would like to include in future issues if there is sufficient interest. The first, suggested by a contribution from David Fenwick in the *News from England* article, is to get some feedback on how your growing of bulbs is affected by climate change. Whether or not you believe in global warming as a permanent phenomenon, it is hard to deny that we are experiencing a warming at the moment. In Auckland, for example, we rarely get frosts now which is in distinct contrast to when I came here 35 years ago. Trees such as *Michelia doltsopa* which were semi-deciduous then are now evergreen. How does all this impact on your bulbs? We are finding that winter flowering species, for example, are starting into growth a little bit earlier every year, which is a bit annoying for a mail order nursery!

I would also like to start a section where readers can share with us combinations of bulbs, or bulbs with other plants, that have been particularly successful in terms of colour, flowering times, or compatibility of heights, form, foliage etc. If you have a good photo to convince us then so much the better, but this is not a requirement!

Any contributions you have, no matter how small, should be emailed to me at adpal@ihug.co.nz

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World News, Views and Events

From England . . .

A New Beginning at Colesbourne Park

John M. Grimshaw

Gardens Manager, Colesbourne Gardens

A few months ago I left Holland and moved back to England and a new job here at Colesbourne Park, in the Gloucestershire Cotswolds not far from Cheltenham. It is a famous snowdrop garden, but the plan is now to restore it to something approaching its horticultural splendour in the days of Henry John Elwes (b. 1846), who gardened here 1890–1922.

Henry John Elwes (HJE) was a giant in British horticulture and his gardens here were justly famed for the diversity of plants grown. As a well-to-do country gentleman he had both the resources and time to devote himself to his passions – ornithology, big-game hunting, butterfly collecting, farming, forestry and horticulture. His numerous trips abroad

(he never spent an unbroken year in England after the age of 17) enabled him to pursue all his interests in natural history at once, and plants came home with the trophies. His most famous collection was made in western Turkey in 1874: a 'magnificent

new snowdrop, as he told the family back home – *Galanthus elwesii*. It was only one of numerous species to bear his name: *Aconitum elwesii*, *Fritillaria elwesii*, *Hippeastrum/Rhodophiala elwesii* are others. His great interest was in bulbous and monocotyledonous plants, and in 1880 he published (with J.G. Baker as co-author) the massive folio *Monograph of the Genus Lilium* with magnificent hand-coloured plates. At the peak of his gardening life he was accounted to have had the finest collection of bulbous plants in the world, grown in a range of greenhouses and the open garden. He was one of the first to breed *Nerine sarniensis*, and the Colesbourne nerines were the very best of their time. (The collection persisted until the 1960s, but then the greenhouse collapsed one winter night and they were all frozen by morning.)

After inheriting the Colesbourne estate he became interested in trees, seeing forestry as a valuable land use on the high and rather cold Cotswold hillsides hereabouts, where farming, then as now, is rather marginal. Frustrated at not finding much information about the potential of many



Galanthus 'S. Arnott'
Photo John Grimshaw.



Galanthus 'Lord Lieutenant'
Photo John Grimshaw.

species of trees, he set about accumulating it and in 1900 commenced a project that led to the publication of the seven volume epic *The Trees of Great Britain and Ireland* between 1905–1913. With the assistance of the botanist Augustine Henry, Elwes studied every tree likely to be capable of producing timber in the British Isles; in the herbarium, in gardens and arboreta, and in the wild if required. In the British Isles alone he ‘wore out two motor cars,’ but he also went to Chile to study monkey puzzle trees (*Araucaria araucana*) in the wild, and to Taiwan to see the great forests there. Among the most interesting aspects of the book is its enumeration of the finest specimens of each species then growing, but in fact there are rather few survivors of these a century later. As part of his research he planted numerous trees around the estate and the arboretum here is an important feature of the park and garden, with many magnificent mature trees.

HJE was too busy in later life to write much about his gardening activities – as a young man he had contributed frequently to the gardening press – so we really do not know what he was growing here. The main account is a chapter written by E.A. Bowles for the posthumously compiled ‘autobiography,’ in which there are mere hints at the plantings and the plants. But a list of his favourite genera is useful: *Paeonia*, *Crinum*, *Yucca*, *Fritillaria*, *Arisaema*, *Kniphofia*, *Lilium*, *Crocus* and *Iris* in the open; under glass, favourites were *Hippeastrum* and *Cyrtanthus*, as well as the nerines, succulents and orchids. *Eremurus* was his main subject for breeding among hardy plants. In many ways this skeletal information is more useful than detailed accounts, because we might feel obliged to follow those more precisely: we use the expression that we are restoring the garden ‘in the spirit of H.J. Elwes’ plantsmanship’. A full restoration would in any case be almost impossible: the house he knew, a vast Victorian mansion, is gone, as are the greenhouses, and the staff!

After HJE died his collection was dispersed by sale or died of neglect and the garden disappeared under the exigencies of agricultural depression and war. About 20 years ago, however, Carolyn Elwes, wife of the current Henry Elwes, began to take an interest in snowdrops and discovered that many had survived under the brambles and shrubs that had grown up. She amassed a good collection of cultivars, and discovered several exceptional seedlings amongst the survivors. With a lot of hard work the clumps were split up and spread around, giving unrivalled masses of choice cultivars. The

many thousands of heads of *Galanthus* ‘S.Arnett’ in a huge patch present an incredible sight, and their scent perfumes the air around them on a warm day. The display has been enjoyed by over 5500 visitors this year, most of whom came during our two open weekends in mid-February!

But there is very little besides snowdrops and trees; filling the gap is my task! We’ll use the woodland areas to make a low-maintenance wild garden, with daffodils and wild flowers in the grassy spaces. A new woodland garden will be created, in which we can grow choicer species in controllable conditions, and the formal garden around the house will be upgraded. It’s a challenge, but the Elwes family and I hope that within a few years Colesbourne will be firmly back on the horticultural map.

If anyone has any bulbs they can spare, John will be only too pleased to find a home for them –
Ed

Coping with adverse weather in the UK

David Fenwick

Here in the UK, as in other places in the world, we are suffering freak weather conditions, and this has greatly effected the way I grow South African bulbs outdoors, even in the warmer south-west of the country. The problem here is that we pick up a lot of rain off depressions from the Atlantic. It has been predicted that with global warming we may well have five times the normal amount of rain, in the next 50 years. The lower light levels associated with this will make it near impossible to flower many winter rainfall species outside. However this isn’t the main problem which will be when these rain bearing depressions mix with polar air, bringing snow and sudden drops in temperature. This means that the soil temperature will drastically fluctuate and the topsoil will freeze solid, and deeper and on far more occasions: apparently a condition the South Africans call Black Frost. On discussing this objectively with Jaco Adendorff, a young, enthusiastic South African bulb collector who visited the garden here a couple of years ago we came up with the following ideas.

That growing groundcover plants or hardier spring flowering bulbs around less hardy bulbs

would take up any excess water from around the bulbs and would protect them from frost. Species so far tested for this include *Osteospermum jacundum* and hardier hybrids such as 'Cannington Roy', *Eragrostis curvula* (seed invasive), *Helichrysum petiolatum*, *Pelargonium grossularioides*, and clipped *Lampranthus* which can be used as an annually planted sacrificial cover as it can be direct struck from cuttings from a small number of overwintered stock plants each spring. Clipping thickens these plants and thus helps with frost protection if they are grown on a flat surface.

Other ideas were to plant bulbs much deeper than books suggest. Many South African species are naturally found growing very deeply to avoid frosts and predators such as rodents and baboons. Here I have had good success planting some *Crinum* down to depths of over 24 inches,

Crocsmia to 5 – 6 inches, and *Watsonia* to 12 inches. Down at these depths the soil temperature is more stable and thus bulbs are better protected from dormancy breaks due to freak days of warmer weather. Other measures to take could be to plant under mature or semi-mature, semi-evergreen open shrubs such as *Buddleja*, thus giving both wind and frost protection at the same time. Apparently *Veltheimia* grow in similar locations in their habitat and can take temperatures down to -5C, and this was proven here last year. However having good drainage is crucial or else the deeper planted bulbs will sit in water, but I have found most established *Crocsmia* and *Kniphofia* hybrids tolerate this very well. The only problem is when you come to lift something, and crinums for example, become almost impossible to dig.



**Planting
and
groundcover.**

Photo
David
Fenwick

UK Bulb News In Brief

John Carter of Rowden Gardens, Tavistock, Devon, has been awarded full NCCPG National Collection status for his entire Water Iris collection.

Dick Fulcher NCCPG National Collection Holder of *Agapanthus* and Diane Rowe NCCPG National Collection Holder of *Dierama* gave presentations on their collections at the IPPS conference in Plymouth late last year.

David and Colleen Fenwick NCCPG National Collection Holders of *Crocasmia* have been invited to Norwich, Norfolk, to officially open a *Crocasmia* Heritage Garden in the city in August 2003. Plants for this garden are being provided by nurseries and the public and the invitation reflects the contribution David and Colleen Fenwick have made in conserving and researching this genus. Nearly 40% of all *Crocasmia* were bred in Norfolk from 1895 to the present day. The garden marks the adoption of *Crocasmia* as the city flower, and it is hoped that the garden will raise the awareness of the genus locally and assist in their conservation. *Crocasmia* 'Lucifer' which is perhaps the most frequently sold and sort after *Crocasmia* was raised and bred by Alan Bloom of Bressingham Gardens, Norfolk in 1966.

For further information visit www.theafricangarden.com

From South Africa . . .

The import & export of seeds and plants into and out of South Africa

Rachel Saunders

Rod and I run a mail order seed company, so most of our experience is with seeds. However, we do export plant material in the form of tissue culture lines and cuttings as well.

Export of Material

To export seeds, we require a licence issued by the Cape Nature Conservation Department. This licence is valid for 5 years at a time, and it allows us to sell "protected flora". At present there are no further restrictions as long as the species are not listed on CITES Appendix 1. This list includes seeds of species such as certain Aloes, cycads, etc, but does not include any bulbous or cormous plants. If I want to sell seeds of these species, I need a CITES permit, also issued by the Cape Nature

Conservation Dept. The only question that is asked on the permit is where we obtained the seed, and if this is legal ie. from plants legally in a collection (not from the wild), then the permit is issued. We live in Cape Town so we fall under the Cape Nature Conservation legislation. At the moment each province in South Africa has different legislation, with some far more restrictive than others. This will probably be changed in the near future so that each province uses the same legislation.

Some countries that we export to require phytosanitary certificates for seeds, and these we obtain from the Department of Agriculture. Depending on where the seeds are going to, the phyto is either an open one simply declaring that the seeds are clean and insect free, or the phyto has to comply with requirements of the importing country. We may, for example, have to have the seeds tested for various diseases.

To export plant material, it really depends on the requirements of the importing country. For example we have exported corms to England, and all that is required is that they are free of soil and have a phyto declaring them insect free.

Tissue culture plants are usually exported straight out of their sterile containers, so they require a phyto only. Our laboratory has been accredited for Australia, so we are able to export tissue culture plants to Australia without any problems.

Import of material into SA

Our Department of Agriculture has produced a booklet with 2 lists of plant genera:

- 1) those whose seed may be imported with no restrictions
- 2) those whose seed requires a phytosanitary certificate. For any genera not listed, we need to apply for import permits, and these can take up to a year to be issued. If it is a plant known in horticulture, the permit is issued quickly. If the risks of the plant are not known, the permit may take months as a risk assessment has to be done.

All plant material imported requires an import permit and a phytosanitary certificate. Some genera may not be imported at all, as they are seen as a risk to some sector of our agricultural industry or are known invasive weeds.

From Australia . . .

Importing Seeds into Australia

Bill Richardson

Quarantine laws and the white and black list discussions have been topical lately with all the revisions pending that will change the ground rules for exporting and importing seeds and plants. Australian Quarantine laws have always been tight and have been upgraded consistently over the past few years. These laws are necessary and we must stop to consider the serious implications that could occur if the Australian Quarantine and Inspection Service (AQIS) did not administer and control the sudden rush of imports into the country.

Here is an extract of an article posted on the AQIS website: "Imagine surfing the Internet and coming across a great site that offers to mail you the seeds of an exotic plant that would look just fabulous in your garden. You place your order, without realising that you might have taken the first step in the destruction of Australia's native flora and fauna. The proliferation of Internet web sites and discussion groups that post plant and animal products anywhere in the world – without regard for quarantine regulations – is a growing problem for Australia."

Fortunately the AQIS website has a step-by-step guide for potential importers to follow and every one of us who imports seed should make the effort to check out the seeds we are ordering from overseas sources. The guidelines are basically set out as follows:

- Check the "Import Conditions Database" section to see if the product you want to import is allowed and the conditions that apply to it.
- Check with your State/Territory Agricultural Department for any special requirements
- Lodge an Import Permit (often a small fee applies) for a species that hasn't previously been imported into Australia. Species already imported into Australia will not require one. You may need an import permit before you import any nursery stock.
- Then, when products arrive they will be inspected and classified according to risk.

If you buy imported seeds that are confiscated, AQIS will send you: a covering letter; an action notice; a risk assessment form; an AQIS "New Plant Introduction Form". There are a few ways this

matter can be dealt with:

- Do nothing and the seeds will be destroyed after 30 days
- Fill in the "New Plant Introduction Form" and return it to AQIS for assessment
- Send \$42.00 Aus. to have the seeds returned to the sender, or, to be treated and held in Quarantine for 30 days.

A warning is also given about the fines that may be incurred for illegal importations and a note sent to the exporter to let them know of the risks of sending these seed to Australia.

Of the 47,000 high-risk items found by Australian Quarantine officers in mail articles last year, 6500 were seeds or plants. Any one of those plants could have carried pests or diseases into Australia – or it could have become a garden or pasture weed as expensive to control as, say, Paterson's curse, which costs our wool industry \$10 million a year. The total bill for controlling foreign weeds in Australia is more than \$3 billion each year.

The AQIS permitted list of seed is under review. The current list contains more than 5000 plants or plant groups. Up to this year, about 300 species are assessed each year with 56% accepted, 22% rejected and 22% set-aside for further evaluation.

Potential importers are free to provide additional information if they wish to have new species assessed.

Other countries need to be as vigilant as Australia. A recent newspaper article in Victoria raised the issue of a tiny Australian tree-eating bug the size of a pinhead, which is causing mayhem in Los Angeles, USA. It was discovered in California three years ago and has killed as many as 20,000 gum trees in Los Angeles and surrounds. The city has allocated \$5 million dollars to initially cut down 5000 eucalypts but it may cost as much as \$10 million to remove all problem trees. These are hard lessons to learn and import problems can only be contained by strict quarantine laws.

Before ordering seeds or plants from the Internet, make sure you do your bit to protect Australia (or your country) by following the proper quarantine import procedures.

The Rainbow Color Genesis of *Allium flavum* subsp. *tauricum*

Mark McDonough

All photographs by the author

Alliums are popularly known as ‘flowering onions’, a reference derived from the fact that true onions (*Allium cepa*) are amongst its ranks, along with consumable allies such as garlic (*A. sativum*), leeks (*A. porrum*), and chives (*A. schoenoprasum*). Pungent vegetable species aside, many hundreds of fascinating *Allium* species offer horticultural appeal for gardeners and bulb-growing hobbyists. They are particularly useful in cold-climate gardens to extend the hardy bulb flowering season past spring, and into the summer months and autumn.

When choosing to grow alliums in the garden, it’s useful to become familiar with the genus basics. The “species count” reported in literature is inconclusive, with wide ranging estimates anywhere between 500 to 1000. The disparity is perhaps due to the circumpolar distribution of species throughout the northern hemisphere and the taxonomic challenge such a vast distribution presents. Distilling a consensus opinion of valid taxa from the recently published Nomenclator Alliorum, which is the first comprehensive compilation of known *Allium* species and epithets, I hand-counted a grand total of over 850 species and subspecies. Not surprisingly given the size of the genus; subgenus classifications were created to help organize species into groups of similar taxa. However, there’s no need for gardeners to fret over subgenus classifications. Even the taxonomists differ on their status, yet they remain useful in grouping together species of similar visual essence.

One such group of allied alliums is subgenus *Codonoprasum*. This group has true bulbs, bright summer flowers, and ephemeral growth that dries up during late summer dormancy. When in growth, its species generally have narrow foliage forming grassy clumps and sheathing up to 2/3 of the flower stems. Distinctive too are the developing buds enveloped in conspicuous 2-valved spathes which can be strongly veined, sometimes silvery hued, and with long tail-like appendages; these odd structures are often as attractive as the flowers that eventually spill out. Popularly grown members of

this group include: bright yellow *A. flavum*; purple or white *A. carinatum* subsp. *pulchellum* (syn. *A. pulchellum*); and variably colored *A. paniculatum* - the latter acquired more often via misidentification than cultivated intentionally. These onions are popular on account of their modest size, ease of cultivation, and fanciful sprays of small waxy bells that appear during the midsummer heat, long after most bulbs have become mere spring memories. It is from this group that I have chosen a handful of species to embark on a path of active propagation, selection and passive hybridization, with startling results.

Most species and cultivar selections within subgenus *Codonoprasum* grow readily in well-drained, sandy or light loamy soils, always in full sun. Given these conditions they become reliable mainstays in the garden or planter, increasing slowly to develop into floriferous clumps over a few years. Members from this group of alliums are easily grown from seed, producing young flowering plants in just two years, and mature specimens in three to four years. Sown late winter, spring, or even in summer, the black angular seed germinates readily in about



Good silver-stem form of *Allium flavum*.

two weeks and the seedlings over-winter outside with ease. In fact it could be said that these alliums seed about too freely, but I’ve never found them to be a nuisance.

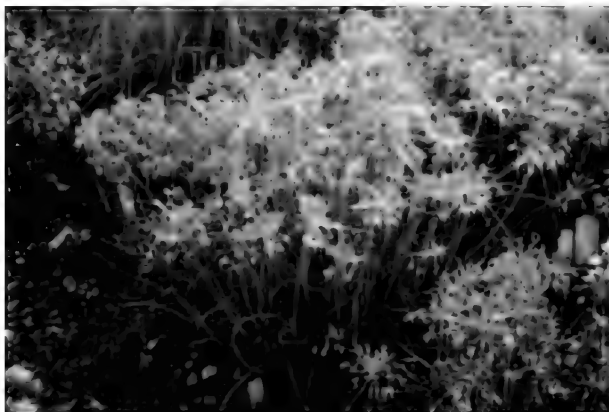
The European *Allium flavum* is perhaps the best-known and widely grown representative from

this group of onions. Grown from various seed sources, variation is evident and plants may be shorter or taller than others; with green, gray or silvery-blue foliage; delicate thin stems or heavy thickset growth; and bright lemon yellow flowers although light yellow and chartreuse flower forms are not uncommon. Seed bearing the name var. *minus* or cultivar names 'Minor' or 'Minus' are favorites among rock gardeners, typically producing smaller plants with slender growth, but occasionally producing truly dwarf, semi-prostrate miniatures. The names however should be considered with caution, as *Flora Europaea* does not recognize them. In the more contemporary publication, the *Flora of Turkey*, the story of *A. flavum* and its subspecies taxa is more clearly defined. In it, *A. flavum* var. *minus* is validly recognized, not in the Central European sense, but as a small Turkish variety with prominent purple stamens rather than yellow.

Surprisingly, the most exciting variety *A. flavum* subsp. *tauricum* has been absent from cultivation until recent years. It is described as having yellow or almost white flowers, tinged with pink, rose, brown or green, and with purple stamens. In the mid 1980s I received seed from two different sources. At first, the only colors that resulted were light yellow faintly overlaid with pink; distinct yet hardly exciting. I continued cultivating seedling progeny from these plants with the hope some variation would reveal itself. Jerry Flintoff, a fellow *Allium* aficionado living in Seattle, Washington, sent me a light orange form that appeared among his seedling-grown plants. Quite a color break! This selection has green leaves and stems, with uniquely hued blooms that were indeed a lovely soft orange, and it remains among my favorites to this day. In the years that followed, seedlings from the orange "tauricum" and other good color forms started to show increased color

versatility; mostly indescribable pastel shades in the first few years, but occasionally rare color breaks would occur.

One summer, much to my surprise, a dark reddish-orange seedling stood out from the sea of pastel seedlings. Singled out and grown isolated, the resulting seedlings produced a strong percentage of equally deep yet variable colors. Ten years later, the palette of colors is remarkable. I firmly believe that almost any color is now possible. Equally astonishing is the range of floral and foliar characteristics, running the gamut from dwarf prostrate plants only 3" (7.5 cm) tall through much taller robust plants 14"–16" (35–40 cm) in height. Plants often exhibit thick, hefty gray leaves and stems that are nearly white with a silvery



A. flavum subsp. *tauricum* "Truly Faded" beginning to open its florets. Deep lavender pink cultivar 'Lindsay' behind and to the left, and brownish-red 'Boston Baked Beans' in the lower right.



A. flavum subsp. *tauricum* "Truly Faded" in silvery bud.

"bloom" or farinose meal. Plant habit is superior to regular *A. flavum*, with most plants clumping exceedingly well. They are usually about 8" (20 cm) in height, with heavy, semi-decumbent stems, forming literal bouquets of blooms at peak flowering in early July. The hot colors both defy and reflect the July heat.

For the past ten years I have faithfully evaluated each year's seedling crop from open-pollinated *A. flavum* subsp. *tauricum* varieties, singling out and growing on the best colors. I have judged growth

and performance in the garden over subsequent years. In that time, I've become ever more enamored with the possibility of relentless variation and divergence, easily fulfilling one's aspiration for enjoying new and distinctive garden varieties. It shouldn't be this easy! Showcasing just a few notable selections of *A. flavum* subsp. *tauricum* lineage demonstrates the possibilities.

'Truly Faded' – In this selection we have many of the best characteristics rolled into one. Growth is thickly set, sturdy, and heavily silvered, producing a forest of frosty blue-white stems topped with conspicuously ribbed, silvery spathes. In bud, the plant is almost as striking as when in flower. Atop each 12" (30 cm) stem, the two, long spathe segments unhinge and recline outwards resembling wispy canoes, spilling many-flowered sprays of lovely faded-rose bells in perfect contrast to the blue-white stems.

'Cinnamon' – This is the first named cultivar in the spicy orange color phase A hard color to pinpoint exactly, remaining one of the most appealing selections to date. The foliage is grayish-green, with thick 10" (25 cm) silver stems, wiry recurved rat-tail foliage, and bursts of piquant cinnamon-orange flowers. Once the drooping bells become fertilized, they stand upright at attention and age to a bright rosy color, creating an unlikely yet quaint combination of pink and orange. In fact, most "tauricums" exhibit an intriguing color metamorphosis depending on the age of the bloom which is fascinating to observe as the inflorescences mature over the three or four weeks bloom period.



Allium flavum subsp. *tauricum*
'Hot Molasses'.

'Hot Molasses' – This selection represents the deepest-hued selection thus far, with drooping bells of a burnt red-orange reminiscent of molasses. The hot floral color spars with the intense, silvery-blue color of the husky 10" (25 cm) stems, offering up an engaging display unrivaled in the "tauricum" genealogy. Unlike most "tauricum" selections that clump up readily and make floriferous clumps in a few years, this clone grows slowly and is stingy with its bulb offsets. It will undoubtedly be useful as a pollen parent for further selection of dark color, stronger-clumping hybrids in the future.



A. flavum subsp. *tauricum* 'Cinnamon' – late anthesis on left, early anthesis on right.

‘Lemon Cooler’ – Surprising when so many unique color forms appear that I should care to select a yellow cultivar, but this superior plant is captivating with it’s refreshing clusters of creamy, pale yellow flowers, like just-popped bursts of buttered popcorn. The growth habit is compact, with a tassel of firm, wiry, gray foliage, serving as fitting complement to the fluffy sprays of moonlit blossoms. With unopened chartreuse buds at the center of each flower burst, the color scheme is as refreshing as lemonade on a hot summer day.



Allium flavum subsp. *tauricum*
‘Lemon Cooler’.

‘Taffy’ – There are many “tauricum” seedlings with unusual tan, beige, melon, fawn, or brownish-pink flowers that defy exact color definition; the effect mysteriously alluring – more so than brilliant and brazen. Plants with flowers of craft-paper beige color are amusing, if not utterly inconspicuous in bloom. This selection however shines as one of the very best and most appealing, epitomizing the pastel colors found within the ever-expanding color palette. The growth is sturdy and compact, with powder silver-blue stems and largish spreading clusters of delicious pinkish-tan flower droplets that seem to emit an inner luminance.



Allium flavum subsp. *tauricum* ‘Taffy’.

A breakthrough in *Allium flavum* subsp. *tauricum* cultivar selection over the years is the appearance of exceptionally dwarf seedlings. This isn’t altogether surprising given that subsp. *tauricum* tends to be compact growing, often of very low stature and decumbent growth. But certainly the prostrate stature of some cultivars gives indication that intraspecific hybridization might be responsible. In the 30 plus years I’ve been growing allium, I’ve seen quite a few spontaneous hybrids that are generally traceable to the suspected parents.

The rhizomatous alliums for example (subgenus *Rhizirideum*) are especially prone to such promiscuous behavior in the garden, the influence of this or that parent is generally obvious. However, with *Allium flavum*, the influence seems less obvious and perhaps more a result of inherent genetic potential. Even so, I suspect the dwarf “tauricum” selections may have derived from garden hybridization with one or more allied species.



Allium Flavum subsp. *tauricum* 'Pastel Parasol'

The cultivar named 'Pastel Parasol' is one of the tiniest and most endearing "tauricum" selections. The gregarious bulbs build into a dense colony of 50-60 bulbs in a few years, producing a frothy mass of sweet little white bells barely tinged with pink, mingling with thready foliage on stems only 3" (7.5 cm) tall. There is a pink-flowered sibling (visible in the upper right corner of the photo) named 'Pink Parasol' that's equally as nice but is a little more sensitive to winter wet and grows less vigorously. Both bloom in late June, one or two weeks before the main flush of "tauricum" flowering; giving further indication that hybridization with *A. sibthorpiatum* or *A. kurtzianum* might be involved.

Allium sibthorpiatum, a Turkish endemic, is one of the cutest miniature onions one could ask for. It's easy to grow, reliably winter hardy, and a dependable year-round performer in rock gardens or planters. In July, the tight tuft of foliage erupts with small, few-flowered clusters of pearly pink nodding bells; the whole affair only 2"-3" (5 - 7.5cm) tall. After the flowers become fertilized, they stand at attention and age to a bright raspberry rose color, for a charming two-toned effect that lasts for weeks [see photo on following page].

Just as with *Allium flavum* and its varieties, this species quickly dries up and retreats into a brief

summer dormancy immediately after flowering, leaving behind plentiful crops of seed. In late August or early September, bulbs resprout with fresh, winter-persistent foliage, which is a growth cycle exhibited by all of the *Codonoprasum allium*s.

Of the very dwarf *A. flavum* var. *tauricum* selections, I suspect the source of the low stature to be from garden hybridization with *A. sibthorpiatum*. Specimens of *A. sibthorpiatum* shown in the photograph are growing in a concrete trough, landscaped with rocks and gravel to simulate a miniature alpine landscape. In the same trough,



Allium sibthorpiatum at early anthesis.



*Allium
sibthorpiatum*
at late anthesis.

several other small *Allium* species are growing, including “tauricum” selections ‘Pastel Parasol’ and ‘Pink Parasol’. Self-sown hybrids have appeared that are very dwarf, appearing intermediate between the two species. One such chance seedling is a tiny white-flowered plant (see photo), growing out from a rocky crevice.

Allium kurtzianum, yet another Turkish species, is a rare endemic found only on a couple of mountaintops. As rare as it sounds, it has become fairly well established in cultivation, albeit misidentified as *A. olympicum* (a different species, also endemic to Turkey). With *A. kurtzianum*, we find yet another distinctive variation on a theme with the most notable characteristic being the absolutely prostrate growth habit. The chunky, silvery stems often produce two flower heads per bulb, turning upright at the end to display dense hemispherical heads of fragrant pink blooms, peppered with long protruding stamens and yellow anthers.

I suspect *A. kurtzianum* readily hybridizes with *A.*

flavum subsp. *tauricum*. In fact, my collection of *Allium kurtzianum*, once pure and true from the original collection on Mount Ida, Turkey, has given way over the years to promiscuous crossing with *A. flavum* subsp. *tauricum*, so that I can no longer say with certainty that I have the true species any more.

I’ve observed first hand bulbs imported from England, supplied by a well-known bulb specialist from his own nursery-collected seed (he grew both species in question). Obviously all of the bulbs shipped were hybrids, having the lovely clear pink flowers of *A. kurtzianum*, but with the much taller,

upright habit of *Allium flavum* subsp. *tauricum*; quite intermediate between the two species. From similar crosses occurring in my garden, and from seed collected off of these imported hybrids, fine-looking plants with bright pink flowers can be had. The unnamed plant shown [see photo on the following page] is one such possible hybrid with wild medusa tussocks of firm, wiry leaves, whose leaden



Tiny white-flowered hybrid seedling, probably *A. sibthorpiatum* x *Allium flavum* subsp. *tauricum* ‘Pastel Parasol’.

Unnamed
pink
hybrid.



gray color beautifully complements the lively pink flowers.

Over the years these whimsical little onions have brought me great satisfaction. Beginning with steadfast yellows of tried and true *Allium flavum*, a decade and a half of open-pollinated bee-induced hybridization and subsequent selection resulted in a mesmerizing array of colors and plant forms. With each batch of seedlings, a high percentage of unique colors tempt the senses and reward close observation. A new acquisition, which is a putative blue-violet form of var. *tauricum* collected in Greece, fuels the imagination of future progeny yet to come. One doesn't need elite access to the world's botanic institutions, nor a comprehensive scientific collection of species, with which to achieve something different. All that's needed is a sincere interest and unwavering patience to observe, grow, and select the plants you like best, and the results will follow.



Mixed bed of 2-year seedlings of
Allium flavum subsp. *tauricum*.

Some Thoughts on Travels

John E. Bryan

All photographs by the author

There are some people who do not like to travel. I cannot understand this attitude. Some people travel all the time and that, too, I find difficult to understand, as the experiences enjoyed when travelling, at least to me, need to be absorbed, thought about and put into perspective. Personally I like to travel overseas at least twice a year visiting certain countries, and then a couple of business trips to see the progress of gardens I am concerned with

I found many years ago that having interesting and interested people with me on my travels makes for a good trip. Consequently I try to assemble such a group and make my journeys all encompassing, rather than just visiting gardens. This means including places of historical and architectural interest, but always gardens as well. I augment the tour by looking at the wildflowers of the country.

Last year I decided to go back to the Netherlands. I used to live in the Hague, while completing my second year of studies after graduating from Edinburgh. Then I worked in the Parks Department, but found time to visit the bulb fields in spring and, way back in the early 50's, made my first visit to the famed Keukenhof Gardens located near Lisse and Leiden. It was to Leiden that Clusius went to be professor of botany when he left Vienna. Taking his bulbs with him, he was the person responsible for the bulb industry being in that part of The Netherlands.

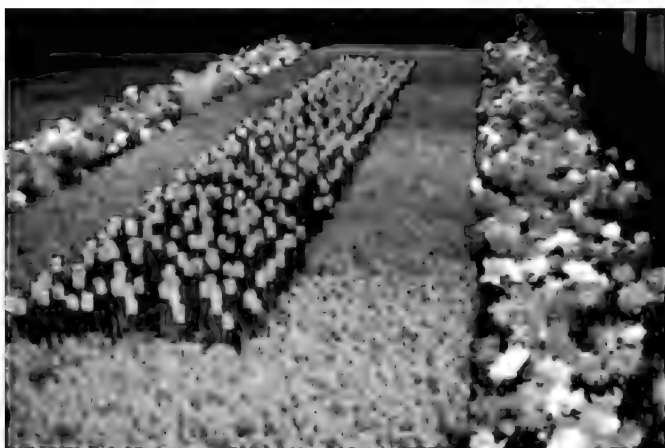
There are some who regard the display of color in Keukenhof as being vulgar. I must admit that the displays are almost overwhelming. Everywhere

you look there is color, with large plantings of tulips and patterns formed by Muscari in numerous shapes, some curved and others circular. Indeed it is as if an artist had used a broad brush on the canvas of the earth, and being a good artist the colors blend one with the other and show off each to advantage. Great skill, knowledge and experience manifest themselves in the planting schemes created.

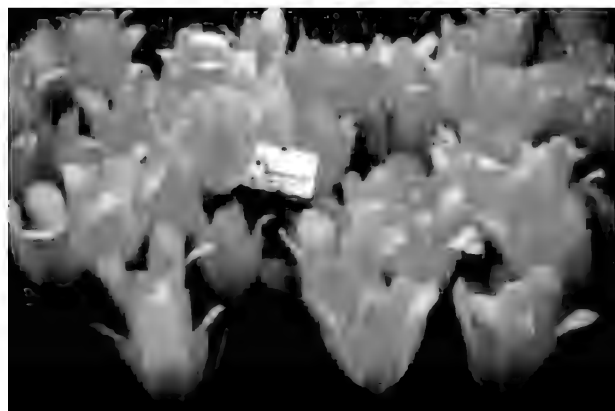


Some of the intricate planting patterns at Keukenhof.

Those of us who have the privilege of designing gardens can learn a lot from noting the forms of



Bold blocks of color.



Tulip 'Big Brother'.

the beds; the juxtaposition of colors; the variation of heights and the fact that some beds have plants just coming into flower, whilst others are in full

bloom. The patchwork quilt effect is so carefully designed that even when one species has finished flowering there is a sufficient mass of another to attract and please the eye.

At the Keukenhof one of the most important factors in any garden, namely scale, is almost unnoticed. Yet, once noticed, it becomes obvious that the maturing trees, which are mostly *Fagus*



Maturing trees are a perfect foil for the colorful beds beneath.



Beautiful vistas through the trees.

sylvatica and *F.s. purpurea*, are superb foils for the beds beneath them. Azaleas, flowering currants, *Ribes sanguineum*, *Philadelphus*, Lilacs, *Symphoricarpos*, *Spiraea*, *Forsythia*, *Rhododendron* and other shrubs provide ideal backgrounds for the plantings. They contribute to

the overall beauty, but allow the spring flowering bulbs to take center stage.

In the greenhouses can be found summer flowering bulbs such as *Lilium*, *Amaryllis*, *Hippeastrum* and *Alstroemeria* with tuberous begonias amongst them. At Keukenhof new cultivars are on show and the entire garden is an exhibition of the bulb growers latest introductions.

These are mixed with long time favourites such as Crown Imperials, *Narcissus* 'Mount Hood' which is still one of the finest whites available, fritillarias, *Anemone coronaria* in an array of colors, and drifts of *Anemone blanda*. Some may find the display vulgar but I find it exciting, and certainly the thousands of people who visit the garden cannot help but be 'turned on' to bulbs.

The species are not neglected, but arranged to show off their forms and colors and so arranged that their often subtle beauty is not overshadowed by their grand and great-great-grandchildren. Another lesson for designers of gardens to note.

2002 is a year of the Floriade. Held every 10 years, the exhibition changes location each decade to an area to be developed and remain a park after the exhibition closes. It provides an opportunity for growers to display perennials and annuals, and for innovators in the horticultural world to show features that, in the future, may become quite commonplace.

Clever use is made of space under glass to show glorious flower arrangements to display bromeliads, cacti and succulents and demonstrate to the public the innovations in

propagation, irrigation and various combinations of bricks, tiles and materials which can be used to create attractive paths.

On seeing how certain trees have been trained and pruned, one might wonder just what was the purpose of such work. Standing back from them,

one notices they form an attractive pattern, thereby illustrating that trees can be used artistically. However, it was the use made of sloping planters covering the numerous food vending booths that attracted my eye. The planters contained primulas, pansies, English daisies in shades of pink, red and white, and calendulas to form a mound of color. It was as if Jacob's coat had been used to cover the booths. I have not seen such construction before. I have no doubt this innovative design will be copied, modified and become an accepted part of parks in the future.

As one travels through the countryside of the Netherlands, one notes the windmills and the very structured delineation of drainage ditches flowing into larger and yet larger ditches until they in turn empty into canals. On the canals are barges and pleasure boats, often above the level at which you are travelling. One marvels at the ingenuity of the Dutch.

It is hard to appreciate that so much of The Netherlands is below sea level, including the City of Amsterdam, but it is the former bottom of the sea which provides the ideal soil for bulb production. Today many people imagine the tulip and many other bulbs are native to The Netherlands, but their history is fascinating even if grown far from their native habitat.

At the Frans Hals museum in Harlem, I was surprised to see a table strewn with *Hippeastrum*, just lying there and flowering without any soil or moisture. This is the first time I have seen such a display.

Visiting the Invasion Beaches in Normandy,



Innovative sloping planters at the Floriade.

plants. *Cytisus scoparius*, with the common name of 'Genet' in French, flowers everywhere in poor soil. This common name gave rise to the Plantagenet royal house which occupied the English throne from 1154 – 1485, Henry II to Richard II. The Count of Anjou, father of Henry II, adopted the name as surname. Richard Duke of York c.1460, used to put a sprig of the plant on his helmet. Fascinating how history and plants are often related.

Allium triquetrum, the three-cornered leek, can be found in hedgerows and in swathes in open moist areas under trees, where it spreads rapidly.

Despite being almost a weed, the pleasing white flowers nodding in the breeze make an attractive sight. *Arum maculatum* can be found but one often has to look carefully for them. Not so in the fall, when the bright orange red berries are conspicuous.

Look closely in the woods of Normandy and you will see *Convallaria majalis*. I saw quite a number of these fragrant beauties. The flowers of various species of *Veronica* are a delight, but one needs a key to be sure of the species. Other lovely blue flowers are the borage, *Borago officinalis* and *Anchusa officinalis*. How the latter got its common name Alkanet I do not know.



Dactylorhiza majalis.

Orchids are always a show stopper and numerous species of *Dactylorhiza* are commonly seen in spring. These are outstanding plants and can form large colonies. There were a great number of them in Brittany, growing in the hedgerows and in open fields.

Brittany has some wonderful gardens, as along the coastline can be found valleys with very mild micro-climates. Collections of camellias, magnolias and large plantings of *Gunnera manicata* together with species of *Rheum* are attractively planted with the large green foliage of the skunk cabbage. The bulbs of *Polygonatum multiflorum* and *Polygonatum odoratum*, while native plants, are used effectively.

As in Britain, *Rhododendron ponticum* has escaped from gardens and is well established in the countryside, forming very large clumps. If you have the chance to visit Brittany, make sure you spend time visiting the gardens and nurseries. The number of species grown rivals those of England, but the wine is to be preferred!



Bluebells on Dartmoor.

One does come across *Hyacinthoides non-scripta* but for whatever reason the countryside does not have the large natural colonies found in England. Most people still call these lovely blue flowers *Scilla*. I was surprised to find an exposed hillside, with no trees in sight, covered with a haze of blue.

This was on Dartmoor – could it be that the bracken, which is not apparent in spring, plays a part later replacing trees?

Some years ago, I came across a lovely stand of *Leucojum vernum* on a bank in a shady lane. This is a rare plant in England, unlike *Galanthus nivalis* which is quite common. *Muscari atlanticum*, a grape hyacinth native to England, can be found if one has some luck. It looks so well growing with

the English primrose, *Primula vulgaris*. When I spotted this combination I thought it had been planted.

Geranium robertianum and *G. versicolor* adorn the hedgerows in southern England, their rosy pink flowers standing out much more than *G. phaeum*, the dusky cranesbill. The yellow flowers of *Meconopsis cambrica*, the Welsh poppy, command attention growing alone at the base of a rock, or at the base of a tree, often alongside the road, and often forming very large clumps.

From the cultivated gardens with almost overwhelming color found at Keukenhof, to the rare species found in the gardens in Brittany, and the natural beauty of the wildflowers in the countryside in southern England, there was always much to see and admire.

I often think we do not fully appreciate the flowers which are at home in the hedgerows, the woods and meadows, or even in walls. We ought to give them attention as they are so lovely. I am glad this is the case, as no matter where I travel I can find plants to admire, ponder over and above all enjoy. It is so much fun to open the eyes of my travelling companions to the beauty and grace of both cultivated gardens and those growing without any attention at all. The flora of the world – how great it is.

When one considers the wild flowers growing well without the attention of man, it is a lesson to all gardeners. We are so inclined to feed, water, prepare special soil mixes and coddle our plants, yet so often this is not necessary. When we do give great attention to our plants I feel we also lessen their resistance to problems. They become too soft and their natural growth habits are changed, not to their advantage.

It is often not appreciated by people that the flowers in our gardens grow wild in the countryside of countries, It is for this reason I love to travel to South Africa, where one can see so many of the bulbs flowering in their native habitats. While many of the wild species may lack the flamboyance of their hybridized garden relatives, no one can deny their grace.

There is an undoubted satisfaction enjoyed when one can identify plants. However, I feel sometimes this stands in the way and we lose the undoubted pleasure of simply admitting the beauty of the plants. After over 55 years of working with, writing and talking about plants, I have begun to realize that no matter if we do or do not know the names, the plants are still as lovely. I wonder why it took me so long to arrive at this conclusion.

The Genus *Romulea* – An Introduction.

Robin P. Attrill

Romulea is one of the horticulturally less well known genera of the *Iridaceae*, comprising around 95 species distributed throughout Southern Europe, Africa and the Middle East. The principal centre of diversity lies within Southern Africa (~70 spp), particularly the Western region, with a few species extending to the summer rainfall regions of South Africa, and thence northwards through the highlands of East Africa. A secondary centre of distribution is found in the Mediterranean area, extending from the Canary Islands and Morocco in the west, to the Middle-East. In the literature the entire genus is covered concisely by Innes (1983). The Southern African taxa have been the subject of detailed monographs by de Vos (1972, 1983), and have recently, along with the other sub-Saharan species, been the subject of a synoptic review by Goldblatt and Manning (2001), which includes several recently published taxa.

In structure *Romulea* are cormous perennials, typically producing one or more grass-like basal leaves which are followed by brightly coloured, actinomorphic flowers on short stems. The flowers typically possess a yellow central cup surrounded by brightly coloured perigone segments, which vary enormously in colour within the genus. In general form *Romulea* superficially resembles *Crocus*, and it is sometimes considered to be the 'poor relation' thereof. This is due in part to the presence within the genus of a small number of small-flowered and 'weedy' species such as *R. pratensis*. This article aims to demonstrate that this perception is misleading, with the undesirable species forming the minority, and many others being of great horticultural value and beauty.

Cultivation

The vast majority of the genus are winter-growers, with the foliage produced during the autumn and winter, followed by the flowers in late winter and early spring. Corms of these should be planted in a very free-draining substrate in early autumn, then watered sparingly until growth is evident. A combination of John Innes No.2 (1 part) with added grit (2 parts) and sieved humus (1 part) is ideal. In general, frost-free conditions are preferable, and excellent light is important to prevent etiolation. As growth proceeds watering is increased until the flowering period finishes, after which the plants are dried off and the corms kept dry during the summer months. Summer baking is not, however, required. In more northern areas, eg the UK and northern United States, the plants are generally best grown under glass whereas in more favoured areas, eg South West USA, Southern Europe and Australia, unprotected planting is the norm. In the latter situation precautionary care should be taken to control unchecked seeding.

Propagation is best effected from seed, which should be sown on the surface of a sandy medium and covered with approximately 1cm of grit. Sowing for the winter-growing species is preferably performed in early autumn when a day/night temperature differential of about 20°C/8°C is ideal for encouraging germination. This typically occurs in 3 to 8 weeks, but in many

cases some or all of the seeds may delay germination until the following, or subsequent, years. The first growing season is crucial; it being important for the seedlings to generate a large



Romulea sabulosa growing en masse
in South Africa. Mary Sue Ittner

enough corm to survive the first period of dormancy. This is best achieved by keeping the seedlings in growth for as long as possible in their first growing year. Subsequently corms typically achieve flowering size in two to six years, with two to four years being usual for most species. An alternative to seed is to grow-on offsets, but in many species these are produced rather sparingly.

In the case of summer-growing species the same general planting advice applies but sowing of seed and planting of corms should be performed during the spring.

Transferring plants between the Southern and Northern hemisphere (and *vice versa*) can be problematic due to the asynchronous seasonal growth cycles. With corms it is generally best to plant as soon as

acquired and to achieve synchronisation by extended growing seasons. This is usually achieved in two growing seasons. With seed there is no issue, as viability is generally good over extended periods and the seeds can simply be stored and then sown at the appropriate season.

In general the genus is remarkably unaffected by pests and diseases, although aphid attacks can be problematic, particularly when grown under glass. Treatment with an appropriate proprietary pesticide will generally effectively deal with this problem. Unlike *Crocus* the corms tend to receive little attention from rodents, possibly due to their reputed toxicity.

A useful account of the cultivation of this, and related, genera is provided by Mathew (1997) in an excellent reference book that all geophyte enthusiasts should acquire.

A selection of *Romulea* worthy of cultivation

As previously noted the genus contains a large number of species worthy of cultivation. The following is a brief summary of selected species from each of the three principal areas of distribution.

Winter-growers from South Africa

R. amoena

Romulea amoena is one of the most strikingly beautiful members of the genus. The lustrous red flower with a black and yellow cup gives rise to the local name of Satin Flower in the Bokkeveld mountains of South Africa where the species originates. The plant responds well to cultivation, flowering in March – April in the northern hemisphere. Propagation from seed is more problematic than with some members of the genus, with germination somewhat erratic, and, when successful,

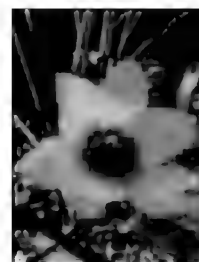


Romulea amoena. Bill Dijk

the resulting one year old corms sometimes fail to attain sufficient size to survive the initial dormant period. Despite these drawbacks the spectacular nature of the plant fully justifies these challenges.

R. atrandra

Romulea atrandra is, in its nominate form, a very attractive rose-magenta species. Its two other colour varieties, *R. a.var. esterhuyseniae* and *R. a.var. lewisiae* have



Romulea atrandra var. *atrandra*.

Andrew Harvie

paler coloured flowers but are equally beautiful. The species is floriferous, grows readily from seed, and is easily maintained in cultivation.

R. bantamensis

Whilst the flower of *R. bantamensis* is rather small the colour combination of dark markings on a rich purple ground is quite exquisite. The plant is a true alpine, growing in the wild at around 1500M on the Hantamsberg plateau in the Western Karoo. Probably as a consequence of its origin the

conventional germination conditions for the genus do not apply, with a period of chilling assisting the breaking of dormancy. Even when this is done germination is, at best, erratic. Mature plants present no such problems, being readily maintained and occasionally producing offsets.

R. hirta

Romulea hirta is an attractive and easily grown yellow flowered *Romulea* with a wide distribution throughout the Northern – and Western Cape provinces of South Africa. Unlike the grass-like foliage of most of the genus, this species possesses unusual winged foliage, with the leaves exhibiting an H-shape in cross section. Propagation from seed



Romulea hirta. Tony Palmer

is straightforward with the plants typically attaining flowering size in two to three years.

R. komsbergensis

R. komsbergensis is an attractive magenta flowered member of the genus, superficially resembling the nominate form of *R. atrandra*. In its floral characters it differs from *R. atrandra* principally by possessing more extensive dark areas in the cup, together with blue tips to the perigone segments. The similarities between these two species have led to a certain degree of confusion in cultivation, with plants



Romulea komsbergensis.
Dirk Wallace

of *komsbergensis* frequently being attributed to *atrandra* in collections. The plant is easily grown from seed, typically flowering in three years from sowing, and is readily maintained in cultivation.

R. monadelpha and *R. sabulosa*

R. sabulosa and *R. monadelpha* form a sympatric pair of species bearing beautiful large red flowers, both possessing a restricted range in the Bokkeveld region of Southern Africa. Whilst the two taxa are readily separable in their typical forms, populations exist in which intergrades



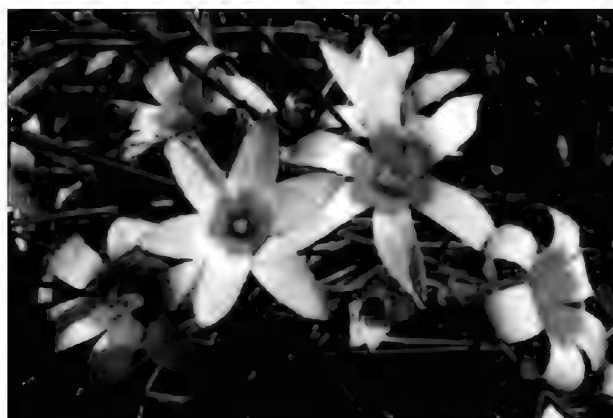
Romulea sabulosa.

Daryl Geoghegan

showing characters of both species are present, and these are the subject of considerable taxonomic debate. With *R. amoena* they share the colloquial name of Satin Flower, and are also sometimes referred to in textbooks as the Bokkeveld Crocus. In cultivation hybridisation sometimes occurs when the two are grown together. *R. sabulosa* is the more widely grown in cultivation, possibly because it is, in the experience of the author, rather easier to germinate. It common with other larger *Romulea* species the plants may take 4 to 5 years to attain flowering size when grown in higher latitudes (e.g. UK) whereas in more favourable locations (e.g. California) flowering within 2 to 3 years is achievable. A useful illustrated account of experiences with the two species in the latter location is given by Hardman (1998).

R. tabularis

The pleasantly scented, lavender-blue flowers of *R. tabularis* are attractive, and are rather reminiscent of the *R. bulbocodium* complex from the Northern hemisphere. The plant is easily grown, germinating readily, and flowering in 2 to 3 years from sowing.



Romulea tabularis. Tony Palmer

R. tetragona

R. tetragona is a smaller flowered species than some but the flowers of both of its subspecies, the rose-pink nominate form and the lilac-pink variety *R. t. var. flavandra* are attractive. The species shares the winged foliage of *R. hirta*, that of *var. flavandra* being an attractive silvery shade of green, but this is an example of parallel evolution as the two taxa not particularly closely related. This species is easy to grow, with flowering in three seasons from seed readily achievable.

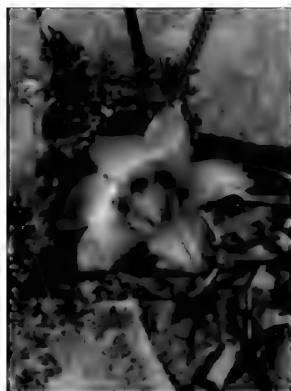
R. tortuosa

R. tortuosa is a most attractive species, and in its best form, *var. tortuosa*, the lovely yellow flowers which possess bold black markings, appear very early, often before the end of December in Northern latitudes. The botanical name refers to the tendency of the leaves to adopt a spiral habit in the wild. In cultivation this feature is usually lost but, interestingly, is retained by the pedicel as the seed ripens. This is another easily grown species, typically flowering in three years from sowing.

In addition to the species described above a large number of other South African *Romulea* are very worthwhile plants, with *barkeriae* (white with dark markings), *diversiformis* (yellow), *hallii* (violet-blue), *montana* (yellow with dark markings), *saldanbensis* (yellow), *subfistulosa* (reddish purple), and *unifolia* (vermillion) worthy of particular consideration.



Romulea montana.
Andrew Harvie



Romulea subfistulosa.
Andrew Harvie

The Mediterranean Species

Despite being rather less flamboyant than their South African counterparts, a number of the northern species are well worth cultivating, and a selection of these are described below.

The *Romules bulbocodium* complex

The *R. bulbocodium* species complex has a very wide distribution throughout the Mediterranean region and in consequence exhibits much variation in flower size and colour. The taxonomy of the group is confused, with a multitude of synonyms in existence. The names detailed below are those in wide use in commerce, and are not necessarily strictly valid.

The following four species/subspecies/forms demonstrate the variation of the plant – all are very worthwhile garden plants. *R. b.* 'Knightshayes form' is an attractive deep violet selection, which was grown for many years in the famous Devon, UK garden prior to being more widely distributed. It is much darker in colour than the typical western Mediterranean forms, such as *R. b. var. clusiana*, several good forms of which are in cultivation, particularly that which is native to Gibraltar.

Romulea bulbocodium
growing
in natural
habitat
in Italy.
Angelo
Porcelli



Romulea bulbocodium growing with
Allium commutatum in a narrow strip no
more than 2 metres from the sea where
they don't get suffocated by other plants.
Angelo Porcelli

Further east the variable pale variety *R. b. leichtlinii* predominates in which the flowers are white flushed with lilac. In *R. 'malenconiana'*, a particularly lovely form, the flowers are pure white.

All of the above forms are easily grown, and provide an attractive display when flowering in early spring.

R. crocea

R. crocea, a native of Turkey, is unusual in the context of the northern species in that it possesses yellow flowers. In other respects the plant is structurally similar to *R. bulbocodium* and may be conspecific. The plant originates in Turkey, where it occurs at a considerable altitudinal range. Introductions from the higher altitudes tend to do better in cultivation.

R. nivalis

R. nivalis is similar in form to *R. bulbocodium* but is distinguished by its more upright form of growth and its very attractive tricoloured flowers in which the violet perianth segments surround a white edged golden central cup. The overall effect is rather similar to *Crocus sieberi* var. *tricolor*. The plant is native to Syria and the Lebanon and is best grown frost-free, being rather more tender than most *R. bulbocodium* variants.

R. requienii

This delightful dwarf species, which originates from Corsica and Sardinia, possesses beautiful deep violet flowers. It is easily propagated from seed and responds well to cultivation.

*Romulea
bulbocodium
var. clusiana.*

Tony Palmer



The Summer-Growing African Species.

R. autumnalis and *R. camerooniana*

These two closely similar species, the former being native to the Eastern Cape and the latter, which has a number of synonyms including *R. campanuloides* and *R. thodei*, is found throughout eastern Africa from Ethiopia to the Eastern Cape. Both species are generally pink flowered but each shows considerable variation in shade from magenta to almost white. In cultivation each flowers during the autumn months and both are attractive subjects, particularly when grown in pots.

R. macowanii var. *alticola*

R. macowanii var. *alticola* is an easily grown species which produces its golden flowers freely

during late autumn, a time of year when yellow-flowered bulbs and corms are in short supply. It is one of the hardier species, performing well in the rock garden. Propagation from seed is straightforward, with flowering achievable in 2 to 3 years from sowing.

Conclusion

I hope that the above account will draw attention to what is currently an under-rated genus of plants that really does deserve wider attention. Very few taxa are thoroughly established in horticulture, and many species possess very limited distributions in the wild. The localisation of these species results in intrinsic vulnerability to changes

in land use, and I believe it is important that responsible collection and establishment in cultivation should take place to gain greater understanding of the genus and its conservation requirements.

An additional aspect of the localisation of many species distributions is that a number of species have only very recently been described, and doubtless others await discovery.

In summary I hope that the day will come



Romulea macowanii.

Andrew Harvie

when *Romulea*, with its remarkable range of flower colour, is regarded as being on a par with *Crocus*, which also includes 'weedy' species such as *C. tomasinianus*!

Selected sources of *Romulea*

The following are useful as sources of *Romulea*, all of which I can personally recommend.

MONOCOT NURSERY: St Michaels, Littleton, Somerton, Somerset, TA11 6NT, UK
(Seed and corms, principally of Mediterranean species)

SILVERHILL SEEDS: PO Box 53108, Kenilworth, 7745, Cape Town, RSA
(Seed of S. African species, catalogue online at www.silverhillseeds.co.za)

RUST-EN-VREDE NURSERY: PO Box 753, Brackenfell, 7561, RSA
(Seed and corms of S. African species)

GORDON SUMMERFIELD: PO Box 5150, Helderberg, Somerset West, 7135, RSA
(Seed and corms of S. African species)

JIM & JENNY ARCHIBALD: Bryn Collen, Ffostrasol, Llandysul, SA44 5SB, Wales, UK
(Seed of selected Mediterranean and S. African species)

In addition to the above society seed distribution schemes including those of IBS, the Botanical Society of South Africa, the Indigenous Bulb Association of South Africa, the Alpine Garden Society and the North American Rock Garden Society can be productive sources of material.

References

De Vos, M. P. 1972. *The genus Romulea in South Africa*. J. S. African Bot., Suppl 9. (out of print)

De Vos, M. P. 1983 *Romulea*. in Leistner, O. (ed) *Flora of Southern Africa* 7(2) Ixioidae, fascicle 2 Syringodea, *Romulea*, pp 10-73, Botanical Research Institute, Pretoria. (ISBN 0 621 07939 1)

Goldblatt, P and Manning, J. C. *Adansonia*, ser 3, 2001, 23(1) 59-108 (available online at www.mnhn.fr/publication/adanson/a01n1a4.pdf)

Hardman, C. *Herbertia*, 1998, 53, 104-105

Innes, C. 1985. *The World of Iridaceae*, pp 315 - 329, Holly Gate International Ltd, Ashington (ISBN 0 948326 01 9)

Mathew, B. 1997 *Growing Bulbs - The Complete Practical Guide*, B. T. Batsford, London (ISBN 0 7134 4290 9)

Biography

Originally from the Isle of Wight, Robin Attrill currently gardens in Essex, UK with particular interests being *Leucocoryne*, *Oxalis* and *Romulea*. Additional botanical interests include *Paeonia*, cultivars of *Papaver orientale*, *Pelargonium* species, and a wide range of 'monocots'. His favourite plants are *Galanthus nivalis*, *Romulea hantamensis* and *Paeonia rockii*, whilst his least favourite are double-flowered *Galanthus* cultivars! Wider interests comprise the flora and fauna of the Isle of Wight, particularly the birds, dragonflies and hoverflies.

Growing Bulbs in Raised Beds

Rachel Saunders, Jana Ulmer,

Mary Sue Ittner and Lauw de Jager

In May this 2001 the International Bulb Society had a discussion on their Bulb Forum on growing bulbs in raised beds in the ground, rather than in pots. The discussion was started by Jana Ulmer, and was taken further by Mary Sue Ittner and Lauw de Jager.

Jana reached a point where she could no longer look after her large bulb collection which was grown in pots. If her interest in bulbs was to continue, something had to change - not only were the bulbs "dwindling", but she no longer enjoyed moving pots depending on the weather, the time of year, etc. She therefore decided to make beds in the garden and to move her collection into the ground. The beds were about 1.25 x 4 meters in size, and the ground was excavated to 0.75 meters deep. The hole was lined with wire mesh to keep the gophers (similar to moles) out, and refilled with a mix of native soil, a "raised bed mix" (similar to potting mix but heavier) and some organic soil amendments such as bone meal. The beds were made of treated timber, and on top of the timber she made a grid with nails and strung string between the nails to make planting "boxes". The boxes varied in size depending on what she wanted to plant in them - larger for Amaryllids (30 x 30cm) and smaller for Irids (20 x 20cm). When she planted the bulbs she tried to arrange them so that each square bordered on a different genus so that if she wanted to dig up one species, the bulbs/corms would be easier to tell apart. She planted the bulbs in autumn, and shortly after winter set in, the birds discovered her smorgasbord and began uprooting the plants, so she had to cover the beds with aviary wire attached to frames. Jana lives in California and on very cold nights she threw blankets over the tops of the frames to protect the growing bulbs. The results in the first spring were wonderful - she had better growth from all species, and more flowers than she'd ever had in the pots. Many of the South African bulbs grown from seeds bloomed for the first time and the Californian species (eg. *Calochortus*) responded just as well. She speculated that this was possibly due to the increased root run, better soil temperature and moisture levels, or a better soil mix. The real question is, however,

what will happen next winter and spring, and the one after that? Already Jana is seeing that certain species have "wanderlust" and are encroaching on their neighbour's territory, and some of the late flowering species are struggling as she planted them amongst early flowering species which require less water later in the season. She also found that she still needs to keep a good eye on seed development in the beds to prevent unwanted seeds from falling into other areas.

Mary Sue's raised beds, made 9 or 10 years ago, are lined with hardware cloth, and although she started off with octagonal beds, she has now also gone to rectangular ones which she finds easier to plant in. She made a few mistakes which she discovered too late:

- if you plant many species of the same genus close together in the same bed, you will never be able to separate them again! She has *Moraea aristata*, *M. gigandra*, *M. bellendenii* and some others all planted close to each other, and although they all bloom every year, she cannot lift the thousands of little corms as she cannot tell them apart!
- don't plant "thugs" in the beds as they will take over - *Lachenalia bulbifera* and some of the *Babiana* species are in this category.
- be careful to plant taller things at the back and shorter species in front, otherwise you will never see the short ones in bloom.

In addition, Lauw warns:

- keep at least 30cm between each planting
- systematically gather all the seeds each season
- do all transplanting, dividing, rouging etc immediately after collecting the seeds and before dormancy has set in, as the plants are easier to find
- protect your bulbs well against predators such as moles.

Both Mary Sue and Lauw mentioned mulch. Mary Sue used gravel when she first started, and now she finds that not only are her beds very rocky, but she has difficulty digging plants out as the gravel gets in the way. She is now mulching with bark, and Lauw uses bark, straw, wood chips or compost. The mulch helps in temperature control, prevents

erosion of the beds, and inhibits weed growth. Both of them also mentioned growing ground covers during summer, and then letting the bulbs come through in autumn and winter. Mary Sue is experimenting with a native Californian vetch (a legume) which grows on the bare ground, then dies back as the bulbs start to come through. After the bulbs have bloomed and started to die back, the vetch starts growing again and blooms (yellow or pink) over the dying bulb foliage. She now wonders whether the vetch will eventually become a problem, and I wonder if the nitrogen in the soil will become too high. Lauw feels that perhaps a ground cover should be an annual that one can destroy, perhaps by burning, in early autumn.

Both Mary Sue and Lauw found that genera such as *Gladiolus*, most *Moraeas*, *Babiana*, *Hesperantha*, *Tritonia* and *Watsonia* were particularly happy in the soil, whereas *Geissorhizas* did better in pots. Amaryllids seem to thrive in the ground, and this is useful as their pots tend to be the biggest and heaviest to move around.

All three of these people live in Mediterranean climates where there is no need to keep the rain off in summer and no need to protect against freezing cold winters. People in summer rainfall areas could experiment with summer growing and winter dormant species in beds, and it would be interesting to hear some of their results.

One point that no one mentioned is how they

keep the beds clean of diseases and pests. We are also growing many of our bulbs in the ground, and we are finding that we have to lift the bulbs periodically and sterilise the beds in some way. This becomes particularly important if one is growing a large number of similar species; for example, we have a bed full of *Zantedeschias*, and another full of *Ixias*. This year the *Zantedeschias* are showing signs of fungal rot, and we will have to lift them all this summer and treat them as well as the beds. The *Ixia* species seem very susceptible to rust and this is gradually spreading to the *Gladiolus* species as well, so we obviously need to start some control measures. This probably does not differ much from disease control in pots, but it is simpler to re-pot one container of bulbs than to empty an entire bed and replant it. Another factor in growing the plants in the ground is whether they require sun or shade. In California the summers are probably cooler than our summers in Cape Town, and we are finding that if we grow the bulbs under 40% shade, they respond better than in full sun. The plants do not become lanky under this shade level, and their moisture requirements are less than in sun.

In conclusion, many of the winter growing South African geophytes do well in the ground, and for people with large bulb collections, perhaps this is the way to go.

PBS Annual Meeting

The Pacific Bulb Society will be holding its first annual meeting on the weekend of Friday, May 23 through Sunday, May 25. On Friday they are planning a guided tour of Dan Hinkley's Heronswood with time left for shopping. Additional garden and nursery tours are planned for Saturday.

On Saturday evening they will meet at Bellevue Botanical Garden for a talk by Loren Russell (you can read about Loren at <http://www.peak.org/~parsont/emerald/Corsica.htm>). On Sunday, they will finish off with some more of Seattle's wonderful gardens and nurseries. Some of these are normally closed to the public.

The cost won't be large. Keep this date open on your calendar!

Spider Lilies for the South

Kevin D. Preuss

All photographs by the author, except where noted

Introduction

Those who have grown spider lilies, as they are commonly called in the Southern United States, know the treasures they bestow on a summer's eve when the elegant, long-tubed, white flowers open and the variously scented nectar wafts through the breeze. The distinctive character is the floral cup, or corona, which is where the name *Hymenocallis* - Greek, meaning "beautiful membrane"- comes from.

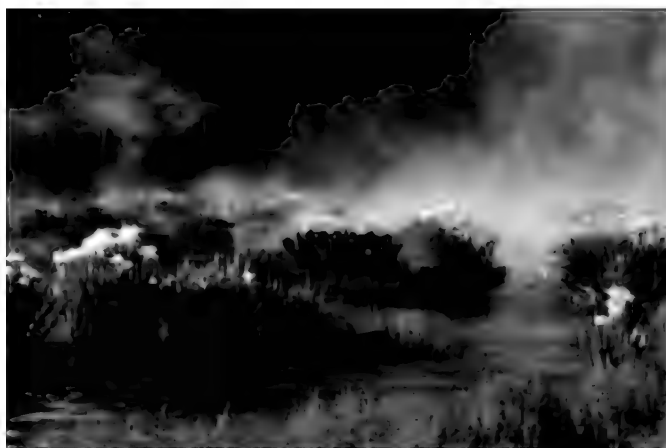
The New World genus *Hymenocallis* Salisbury (Amaryllidaceae), recognized as a distinct genus since 1812, is composed of roughly 70 to 80 species with plenty of room for debate. Such a large genus provides a plethora of species for cultivation under an array of conditions from aquatic to xeric. The native habitats range from Indiana, Kentucky, Virginia, south to the Carolinas, Georgia, Florida, Alabama, Louisiana, Texas and Mexico where the genus explodes. The majority of the species occur in Central America and radiate down into the northern portions of South America (Venezuela, Guyana, and Brazil) as well.

The three closely related genera (once classified as *Hymenocallis*) *Elisena*, *Ismene*, and *Leptochiton* replace *Hymenocallis* in the Andean regions. For practical purposes when referring to hybrids in this article, the genera *Elisena*, *Ismene*, and *Leptochiton* are recognized under the genus *Hymenocallis* in a broad sense, but they are distinct groups and are not the true spider lilies. This is not a taxonomic review, although the current and reasonable trend set a few years ago by Meerow and Snijman recognizes each group as distinct genera; together the four genera comprise their tribe Hymenocallideae. The taxonomy of the group seems in flux continuously.

Habitats

In the United States, *Hymenocallis* populations most often occur in or on the margins of wetland ecosystems (marshes, lakes, rivers, forested swamps, wet prairies). Less often they occur in dry woods (*H. galvestonensis*), flatwoods (*H. henryae*), or in disturbed sites such as pastures and roadside

ditches where some populations of *H. palmeri* and *H. galvestonensis* can be found. Coastal dunes provide a home for *H. latifolia* var. *keyensis*, found on Bahia Honda key in Florida. They are most spectacular when found blooming on many rivers and spring runs in the Southeast, such as the Cahaba lilies (*Hymenocallis coronaria*) on the Cahaba River in Alabama



Hymenocallis coronaria on the Cahaba River. Photo by Beth Young

and the spider lilies (*H. rotata*) on the Santa Fe River of northern Florida.

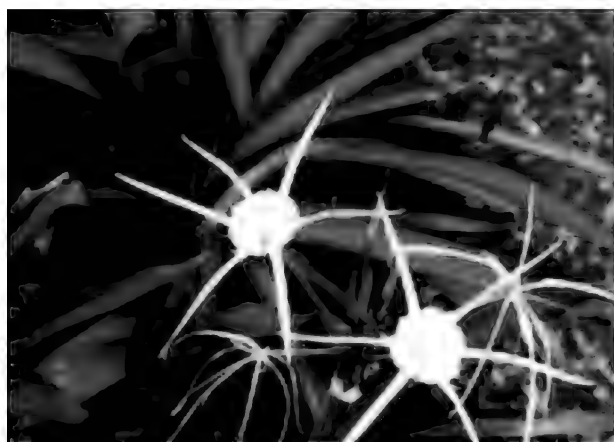


Hymenocallis rotata Gilchrist County, FL.

A few of the southeastern US species are listed as threatened or endangered and are protected in more than one state at the state level. Spider lilies

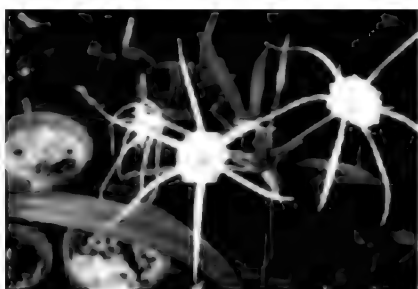
are commonly cultivated throughout most of their range and are grown in many tropical parts of the world. They do make excellent cut flowers, even if short lived. A few of the tropical species do hold their flower for a few days, however.

In the South the most commonly found cultivated species are *H. caymenensis*, *H. latifolia*, *H. littoralis*, *H. lirisome*, and *H. "Tropical Giant"*.



Hymenocallis caymenensis.

The name "Tropical Giant" is thought to have been given to a "wastebasket group" under one collective name for the many large clumps of spider lilies commonly cultivated throughout the Gulf states - these have large, broad leaves with many small-cupped flowers.



Hymenocallis choctawensis.

Other species native to the South East United States such as *H. caroliniana*, *H. galvestonensis*, *H. rotata*, *H. choctawensis*, and the smaller sized species *H. traubii*, *H. duvalensis*, *H. henryae* and *H. palmeri* are all more than suitable for cultivation.



Hymenocallis duvalensis -
Alachua
County, FL.

These species are more hardy and may be grown under temperate conditions if provided protection from extended freezes. However, successful cultivation of most *Hymenocallis* species requires particular knowledge of the species, and at least a little bit of information regarding its habitat. When dealing with plants of the genus *Hymenocallis*, locality information, if available, may be more important than the species name attached to the plant, especially as the taxonomy of the group is unstable.

Spider lilies, Dixie lilies, alligator lilies, or Cahaba lilies are grown both in gardens and pots. Seasonally wet loca-

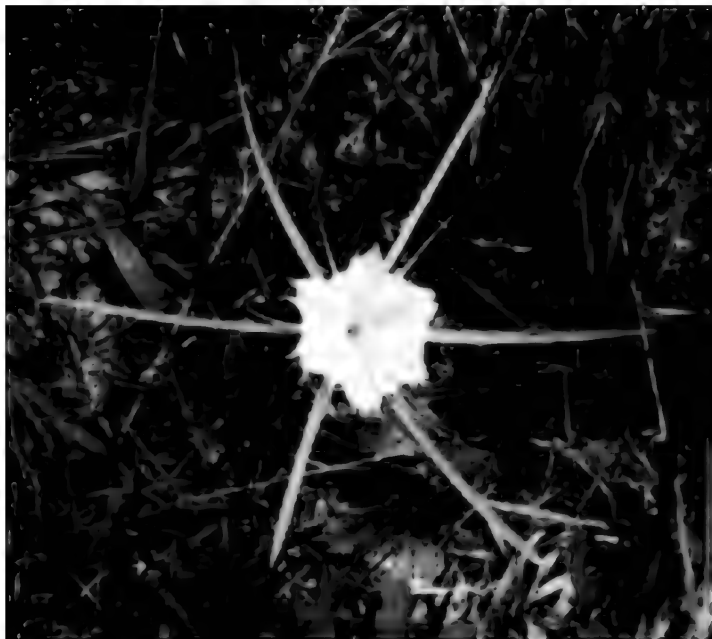
tions in the yard or garden with partial shade provide a suitable environment to grow the bulbs in the ground. Once established in the landscape, a colony will flower for weeks, with flushes of new blooms replenishing the fading ones. Although spider lilies may be successfully grown in containers, they enjoy the freedom to pull themselves down into the ground.

If you choose to grow the plants in pots, large pots or tubs are recommended for clumps of mature bulbs. Tubs can hold large clumps and provide ample water. Some of the new plastic pots are like tubs, but more decorative and have a plug on the bottom that can be removed in the colder winter months when some species prefer to be dry. When using standard pots, a saucer placed underneath the pot will help retain a sufficient water supply. There are several new lines of pots with self-contained water reservoirs and a couple of types have performed well in growing seedlings of *H. duvalensis*, *H. rotata*, *H. palmeri*, *H. traubii*,



Hymenocallis tubiflora.

H. choctawensis, and *H. coronaria*, all of which are semi-aquatic to aquatic species.



Hymenocallis palmeri - Desoto County, FL.

Several of these species are fine candidates for the water garden. Since many species thrive in at least semi-aquatic conditions, most are easily grown when wet conditions are provided. Plants that remain in standing water should be periodically drained and allowed to dry out, in part at least. It is important to note that while several species are aquatic in their native habitats, they do, however, dry off when the water levels recede and some may even experience dormancy.

When using pots or tubs, it would appear that most species are better suited in larger sized ones. A general observation has been that the plants will reach an overall larger stature in larger pots or tubs. Granted, these can be untidy at times, in particular when plants begin to shed their leaves, but the unsightliness is well worth the mass of blooms in the preceding months.

The tropical species such as *Hymenocallis arenicola*, *H. littoralis*, *H. caymensis*, *H. tubiflora*, *H. speciosa*, etc., are well suited for cultivation in the southern portions of Florida and Texas and some points in between where frost exposure is not prolonged. The tropical species are excellent greenhouse plants as well, but can become cumbersome due to their larger sizes.

The numerous Mexican species present a little more of a challenge to the gardener. Collectively, the Mexican species are more diverse in their range of habitats than are their northern counterparts. The

Mexican species vary in habit from xeric to aquatic. The arid climate of parts of Mexico and increased elevation make it rather difficult to replicate environmental conditions in the Southeastern United States. The Mexican species and hybrids ought to be increasingly grown on the West Coast of the United States and in Australia, as well as many locations in Southern Europe. Clay pots and a more porous medium is recommended for growing the xeric species.

The species of Andean genera of the tribe Hymenocallideae generally do poorly in the deep southeastern United States, when cultivated under hot, humid conditions. Thus, their hybrids do not perform well in the hot humid climate of the South. Both species and hybrids do better when grown in the drier and higher elevation climates of California, South Africa, and parts of the Mediterranean and Australia. These plants may replace spider lilies in the landscape in northern Georgia, western Carolinas, Kentucky, and as far north as southern Ohio.

Hymenocallis hybrids are not commonly cultivated and just a few are readily available to the bulb market. For the most part, hybrids have been developed from the *Ismene* and *Elisena* groups*. As for hybrids of true *Hymenocallis* (excluding *Elisena*, *Ismene*, and *Leptochiton*), breeders such as, to mention a few individuals, Thad Howard, Luther Bundrant, Len Woelfle and James Bauml have made progress in hybridizing numerous species of Mexican *Hymenocallis*. Most are not available commercially, however. Those hybrids and crosses of Mexican species will not be addressed



Ismene amancaes.

here. Both *Hymenocallis* x 'Hispaniola' and *H.* x 'Invicta' are selections from the cross of *H. traubii* x *H. imperialis*. *Hymenocallis* x 'Pirate Queen' is the resulting chosen clone selected from *Hymenocallis traubii* x *H. lirisome*. A hybrid of unknown parentage labeled as *H.* x 'Indian Queen' was given to me back in 1998, but has not yet flowered. There is plenty of room for progress and improvement of spider lily hybridization.

Many hybrids that are available, such as *H.* x 'Buckeye' (*H. longipetala* x *H. lirisome*) - a more hardy clone, and Bundrant's *H.* x 'Excelsior' (*H. traubii* x *H. narcissiflora*) involve *Ismene* or *Elisena* in their backgrounds. Both genera readily cross with each other and *Hymenocallis*, leading many to classify species of both *Ismene* and *Elisena* as *Hymenocallis*, which is legitimate when including the genus *Leptochiton* as well.

This blooming season of *Hymenocallis* species has finally inspired me to establish a *Hymenocallis* breeding program, focusing primarily on species from the SE US and tropical regions in the hope of obtaining hybrid selections that will perform well under hot, humid conditions. Some of the characteristics bred for are smaller plants with increased numbers of flowers; increased recurrent blooming cycles; coloration (green) in the tepals with yellow in the center of the corona; and to reduce the aquatic

nature found in some parent species. Successful crosses so far have involved various combinations of simultaneously flowering species *Hymenocallis rotata*, *H. palmeri*, *H. choctawensis*, *H. caymensis*, *H. tubiflora*, and three different forms of *H. latifolia* - including *H. latifolia* var. *keyensis* and also an undetermined seedling from the Yucatan Peninsula.

In the summer of 2002, I crossed *Leptochiton quitoensis* with an undetermined *Hymenocallis* species (*H. latifolia*?) from the Yucatan and one



Leptochiton quitoensis - Ecuador.



Hymenocallis sp. from Yucatan, Mexico.

pod with 12 brownish colored seeds was produced. However, the seeds did not appear fully mature, as compared to *L. quitoensis* self-pollinated produced seeds. Surprisingly, after one month the seeds began to germinate. In the reciprocal cross, pollen of *L. quitoensis* was placed onto a few pistils of *H. choctawensis* from Dothan, AL, but was rejected.

Hymenocallis are one of the most easily cultivated amaryllids in the South. Spider lilies have the potential to be widely cultivated in many of the milder climates throughout the world. Today's international bulb market offers a wide array of species of all groups, although most are limited in availability. Growing various combinations in the

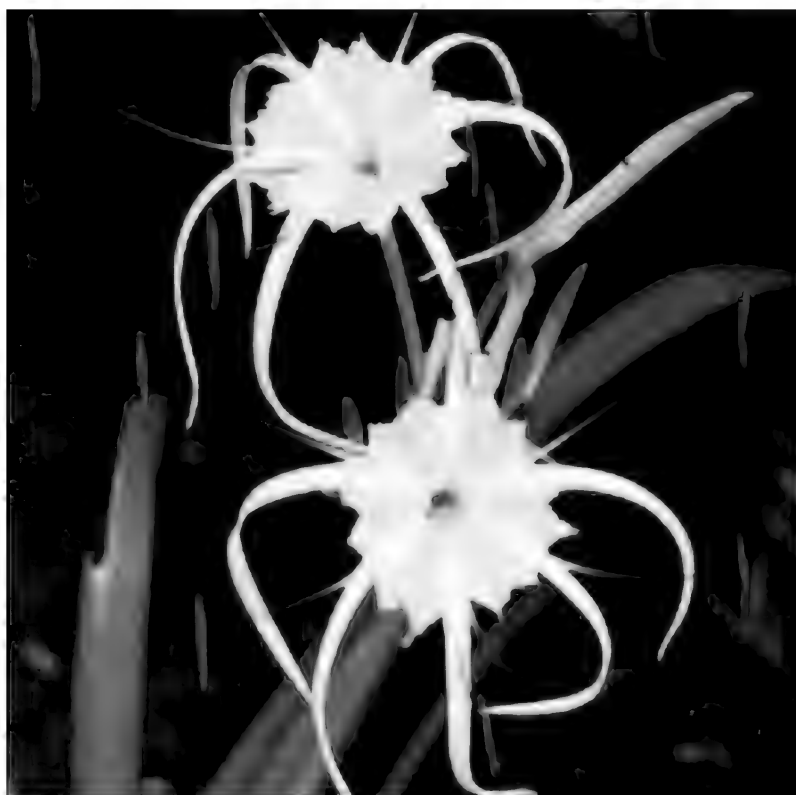
garden will provide blooms of various magnificent spider lilies from March through at least November in warmer parts. The sheer elegance and variously scented perfumes of their flowers, which are so commonly visited by long-tongued moths in the evenings, are truly enjoyable in most any setting.

* FOOT NOTE – The first reported *Hymenocallis* hybrid was *H. x 'Spofforthiae'*, a cross between *H. narcissiflora* x *H. amancaes* made by William Herbert, (which under the recognized classification is *Ismene calathina* x *Ismene amancaes*). That hybrid and Arthington Worsley's *H. x 'Festalis'*, a cross between *H. narcissiflora* x *H. longipetala* [*Ismene calathina* x *Elisena longipetala*] were a platform for other

breeders' works. The Dutch bulb company van Tubergen's replication of Herbert's first cross provided the industry with *H. 'Sulfur Queen'*. Len Woelfle produced a few other named selections of that same cross, the most prominent being *H. 'Pax'*. Len Woelfle made the reverse cross of 'Festalis', using *H. longipetala* as the seed parent and *H. narcissiflora* as the pollen and the resulting selection was named 'Fiesta'. *H. 'Festalis'* was backcrossed on *H. narcissiflora* to get *H. 'Advance'*. Another combination of the South American genera *Ismene* and *Elisena* came from Len Woelfle's cross of *H. amancaes* and *H. longipetala* which produced his "Dancing Dolls" line with selections such as *H. 'Ballerina'* and *H. 'Dancing Doll'*.

Kevin Preuss, 35 years old, has from the University of Florida, a Master of Science in Horticulture/Botany and Bachelor of Science in Botany. Although his formal training was in plant systematics, growing amaryllids has become his passion.

In addition to recently establishing Amaryllis Plus Bulb Company, a certified nursery propagating and offering mostly New World amayllids, Kevin is also an adjunct Field Biology instructor at St. Petersburg College.



An unidentified *Hymenocallis* sp. collected from Guatemala by Dr. Robert Dressler.

An English Bulb Gardener

Reflections of a New Experience and the creation of an African Bulb Garden

If someone saw your garden on the internet, liked it, and had an interest in the plants that featured on it, and then asks by e-mail if you can help them do the same. What would your reply be?

Probably, certainly, or no, most definitely not, but an answer could also depend on: where the garden was; its intended size; workforce; available funds; and what local and natural resources were available. On asking for more details I received the reply, "I'm Charles Lindsay Bolden CBE QC, an IBS member. I'm gardening on Barbados and want an African Garden". At the time I can honestly say that I didn't know how I felt, but I can say for sure that the thought of it was most appealing. Not because it was on Barbados which is somewhere I had not been, but more for the thrill of creating an African Garden on a much larger scale than my own - initially over an acre in size. As an African bulb fanatic and professional horticulturalist / landscaper in limbo, pardoning the pun, just how could I refuse ! All I needed was permission from my wife.



And we thought he was there to work!

As one can imagine a lot of e-mails were sent across the Atlantic, and thousands of bulbs and seed were donated to the project from my own

in Barbados

David Fenwick

All photographs by the author

collection here in the UK, which includes the National Collections of *Crocasmia*, *Chasmanthe* and *Tulbaghia*, or were purchased from both wholesale and retail sources. Indeed wherever possible local suppliers in Devon and Cornwall in England were used to ensure phytosanitary requirements could be met. Many bulbs were also obtained from other fellow National Collection holders, such as *Agapanthus* from Richard Fulcher at Pine Cottage Plants, and *Dierama* from Diane Rowe. It was decided at an early stage that the plants and seed collected for export should travel in three main shipments, with the shipments being of ever increasing size and diversity.

By the time of flying to Barbados in March 2002, over 150Kg of bulbs had been amassed in readiness for propagation and planting. Each shipment had to have its own Import Permit from the Ministry of Agriculture in Barbados, together with the appropriate UK phytosanitary certification. Labelling, numbering, counting and cataloging was an absolute nightmare because of the sheer number of species and the number of bulbs. The Barbados Ministry for Agriculture stated that because the South African bulbs and plants were of UK origin, they only had to be pest, disease and soil free. Achieving this may sound easy, but when you live in a small house with a kitchen no bigger than a postage stamp; washing, preparing and drying 2-3,000 bulbs or more per shipment is enough to drive anyone crazy, especially one's wife. It is also surprising just how many toothbrushes and pairs of scissors you get through in the preparation process. For instance 1000 *Agapanthus* seedlings were obtained in 7cm square pots and most were potbound, which made the job more difficult. These took two people, 2 days to prepare and their eventual weight for sending was just 24Kg.

I went to Barbados knowing as much about the island as a person who watches the odd holiday program now and again. The first contrast I noticed with the UK was obviously the airport as the only comparison I could make to Gatwick, London, was the plane I had left in some eight hours before!

After such a long flight I was relieved to meet my friend and host, Charles Lindsay Bolden, Vice-President of the Barbados Senate and owner of the Ayshford Ratite Gardens where I was to stay and help develop the garden. My quest for knowledge started as soon as we left the airport. Travelling back to the gardens we passed large fields of sugar cane, and hedgerows that contained at least a few familiar plants, such as *Setcreasea*, and the African aliens of *Sansevieria* and *Leonurus*, both of which I had shipped and intended to plant. Through the city of Bridgetown and outlying villages, coconuts and bananas replaced my equivalent, apples and pears, and varieties of *Hibiscus* and *Bougainvillea* were commonplace. The best surprise was the number of cycads that were grown, and some were seen of very large size. Perhaps the weirdest sight, having been on the island for just an hour, was the sight of a lone *Thuja plicata*, a cold temperate conifer, which was well out of place but alive and surviving in the tropics. It seemed quite ironic that in England and elsewhere we all strive to create our own garden paradise, and that whilst in paradise we'd be seeking to create something quite foreign and alien.

I spent the first few days adjusting to the higher heat and humidity, and deciding where to site the new garden. On being asked about the climate I replied, "It's just like working inside a tropical greenhouse in the UK, only that they don't build them on slopes". Being enthusiastic and working at a UK pace in 34 degrees of heat and 100 percent humidity sapped the stamina very quickly for a few days. However, two suitable garden locations were found for the new African Garden. One was quite far from the plantation house and consisted of a large open field. The other was closer to the house, and beside an already existing rose garden. The first area, the large field, had good and deep

soil, but there were no definite boundaries to use, and the site was far enough away on the 50 acrea estate as to create both security and management problems. The second area had distinct boundaries but most of its topsoil had already been used elsewhere. However its aspect and topography suggested it was by far the best site for the garden for it had some shade around its boundary and was a south-west facing hillside, which was ideal for terracing and creating the beds that would be



The favoured site.

needed.

All the soil and stone had to be imported, and this included around 200 tonnes of soil and a similar amount of stone. Stones measuring 15 inches (38cm) in diameter were used for walling, and pieces to one and a half metres (5 feet) in diameter



That's more like it.

were used for the construction of the rock terrace.

The type of stone posed a significant problem, as the natural and most common stone on the island is coral rock, which is very sharp, highly alkaline and of irregular shape. Its only advantage is that it can be relatively soft. With very few planes, flat pieces are rarely come across, and it can be very difficult to use as a walling stone for this reason. A very good eye is needed. Fortunately, walling with them and creating a third of an acre of terrace was very similar to using the harder Devonian limestone with which I was only too familiar. The only initial problem was in developing a kind of sign language between myself and a local Bobcat driver, who was to move and place the heavier stones. Very few people involved in the construction industry on the island have any experience of creating gardens. All I can say, is "Well done John", and thank him for his patience.

The most contrasting thing to UK and temperate horticulture has to be the soil husbandry, as techniques used in Barbados are markedly different. The soil pH, that you would expect to be alkaline, is indeed very variable, even over small areas, and due to salt contamination. Soil consists mainly of a mixture of a very sticky clay, coral sand and grit. That which was imported could only be described as very lumpy, and its structure the strongest I have ever experienced during my horticultural career. You don't tread on a lump of soil in Barbados and hope to break it up as you'll break your leg on the first attempt. In Barbados you have to irrigate constantly and allow the sun to heat the wet clods and break them up over several days. Even when the soil is wet there are still problems, as it can easily turn a six foot man into one seven foot or more, by the amount that sticks to his wellies. Fortunately, soils tend to be free draining because of their perfect structure and thus they dry out very quickly in both the heat of the day and the easterly trade winds.

Soil preparation is critical for growing a wide range of plants on Barbados and here my first thoughts were that there might be copious amounts of organic matter in the form of coir compost that one could use. However, there was nothing of the sort and the only source of organic matter existed in the form of home made compost, mostly made from the cutting of elephant grass which can achieve eight feet in height. Regular mulching and soil enriching would be vital due to the high rate of breakdown as a result of the high heat and humidity. All of the peat and compost that is used on the island is actually imported from as far afield as the

UK and Ireland, and it is over three times the price so is used sparingly. Horticultural tools and sundries are also very expensive – if you can get them. An average wheelbarrow costs about ninety pounds (\$135US); a toilet seat nearly sixty pounds (\$90US); and on asking for a garden sieve the reply was either "What's that" or "No, sorry". A very suitable form of plastic shopping basket was found I am glad to say, and fortunately the local and very palatable rums were much cheaper in comparison. The answer to this was, "if you cannot buy it, design it", for there are some very skilled craftsmen on the island. We asked a carpenter to produce large landscaping rakes, and from a rough sketch he made what turned out to be any landscapers dream rake: a four foot head made of green heart with purple heart tines, and with a six foot lighter pine handle.

Getting back to the garden and its plants, a collection of bulbs, succulents, shrubs and seeds numbering well over 400 varieties had been amassed prior to my visit. Aloes, Proteas, Zantedeschia, Amaryllis, Eucomis, Crocosmia, Chasmanthe, Agapanthus, Dierama, Tulbaghia and Crinum were just some of the genera, but no-one knew with any certainty what would do well, what would die, or what could become weeds, but for sure it would be pessimistic to say that 'nothing' would grow as some regions of South and Southern Africa do have a very similar hot and humid climate with little seasonal change. We remain optimistic and regard our approach somewhat as a trial. Our intention was to propagate many South African bulb species from seed as these would mature quickly in the heat and humidity and would be most cost effective in relation to their import and size of area to be planted. The other benefit would be that seedlings could be selected for how well they perform, and the best selected for propagation and eventual planting. What was found, and very quickly, was that the climate on Barbados is a propagators and cut flower growers dream. Most plants are propagated with ease, and growth, including flowering, is achieved very quickly. However, some bulbs such as *Chasmanthe*, flowered profusely within weeks of planting, but growth and flowering was so quick that the bulbs never had a chance to build up reserves or even offset. Therefore in some cases bulbs might have to be grown to flower from annual sowings rather than relying on perennial plantings as we do in cooler latitudes.

The design, landscaping and propagation stage was completed in a little over three weeks. Another three weeks, a month later, was arranged

Author in
shaded
nursery
area.



for the planting and yet more propagation. Designated beds were constructed, and arranged by climate zone, so that the more familiar temperately grown South African species were placed in beds encircling the area, and under some shade. The more tropical genera were included in its centre, along with a large African succulent collection which was planted on the terrace, with some of the smaller species of bulbs. At the top of the terrace an African hut was planned which, covered with *Gloriosa*, will provide shade during the heat of the day, and some amazing vistas across the garden. Wherever possible, paths were also designed to allow for wheelchair access between the beds. The initial planting of the garden was completed in June 2002 but it is expected to take a few years for the garden to mature, as many young *Strelitzias*, including the species *S. reginae* and *S. nicholae* have been planted, together with *Proteas*, *Leucadendron* and other shrubby genera.

Further theme gardens and projects are planned for the old cane plantation at Ayshford by its owner, and some thirty acres have been dedicated for future development as gardens. Ayshford not only has the potential to become the largest garden on the island, and a major tourist attraction in its own right, but it also has the potential to employ many local

people and facilitate new careers and new horticultural industries, skills and training through it's eventual botanical diversity and the use of resources that its development will create.

Ayshford Ratite Gardens is not just a garden, as its name suggests, but ostriches are also reared for their meat which is prepared, cooked and served on site at the ostelry restaurant. Ayshford also caters for weddings and other functions and provides cabaret and guided tours for local islanders and those new to the island, or who arrive as part of a cruise. Indeed, both the local population and visitors are well catered for in a very relaxing atmosphere. So don't let anyone tell you that Barbados is just sun, sea, sand and coconuts. It's much more than this. Further information on Ayshford and the development of its gardens can be found at www.caribbeanostrich.com.

I returned to the UK several pounds heavier after being well fed, looked after and entertained by my charming and most grateful hosts, who I must thank for the opportunity and wish every success for the future.

Book Reviews

Lisa Flaum

Bulbs 2nd edition John Bryan, Timber Press 2002
ISBN 88192 529 2 \$89.95 US.

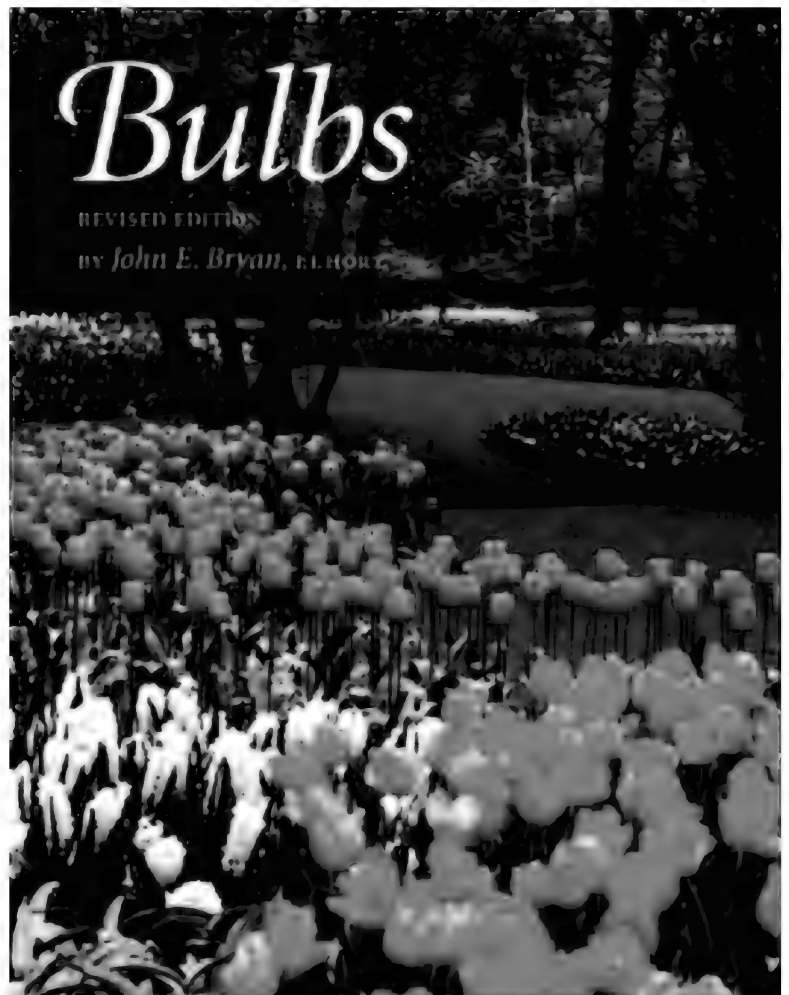
At 534 pages of text and another 350 or so odd color plates, the author's belief that more bulbs are described in this volume than in any other is certainly correct. Nevertheless, it is frustratingly lacking. Mr. Bryan says that many genera have been added. "Certain of them have not been regarded as bulbs even in the broadest sense." Certainly, *Hemerocallis* is not generally regarded as a bulb and I am not sure why it made the cut when *Rauha* did not, or what makes *Sanguinaria canadensis* bulbous, but not *Claytonia virginica*. Descriptions for most species are very brief, and, for large genera such as *Allium* and *Zephyranthes*, provide little to separate the various species, even when they are listed. In the instance of *Allium*, the author took his species list from Mathew's *A Review of Allium* Section *Allium*, so if it wasn't there, it isn't here. Frustrating if you are looking up onions from Janis Ruksan's catalog!

Likewise, controversial plants seem to move about at will. The author gives *Amphosiphon* and *Androsiphon* sections of their own, even though both have been placed in *Daubentya*, for ease in discussing their cultural requirements. The lively renaming of these plants is noted under each heading. Yet *Cooperia*, which is kept separate by Thad Howard in 2001, is listed only a synonym for various *Zephyranthes* species, with a brief remark about its previous existence as a separate genus.

The photographic quality is also uneven. With 1171 color photos, there were sure to be a few average ones, but there are altogether too many that are blurry, or poorly colored. Likewise, there are those that seem unnecessary, such as a pot of

dormant *Brunsvigia josephinae*, and 3 pages of daylily cultivars (though none of the species are discussed). Some photos were flipped after the captions were written, so that upper left is really upper right.

There are, however, many genera and species in this book that a reader is not likely to encounter



elsewhere. *Proiphys*, for instance, from Australia and *Radinosisiphon leptostachya* from southern Africa. How about *Stenanthium*, from Mexico north to Canada, and an island off the coast of Siberia? I would like to have seen photos of these. There is a large section on species *Caladiums* that was great fun to read.

The synonym lists are useful, and I enjoyed

browsing thorough Appendix A, the Families of Bulbous Plants. *Bulbs Around the World* was a little frustrating, listing the genera, as it did, sometimes under a country and sometimes under a geographic heading. Plants were listed only under their principal location, so that the Republic of Georgia has only 2 genera and Europe has no cyclamen and no alliums. The bibliography is lengthy and the index of common names is grand.

There is some advantage in having so many plants described in one book. Certainly, Mr Bryan's love of bulbs comes through loud and clear. It is very like an encyclopedia though; handy for looking up something if you don't need to know it in any great depth. The gardener already obsessed with bulbs who has the slightest tendency toward buying books, has probably already amassed a library that will provide more practical growing information than this book. The photos of more unusual species are great, but there are not enough of them. At \$89.95 US, this is probably too expensive for most gardeners. Check it out at your local library first.

Spring Blooming Bulbs. Brooklyn Botanic Garden Handbook #173 ISBN 1 889538 54 X \$9.95 US.

Part of the Brooklyn Botanic Gardens's 21st Century Gardening series this, like its predecessors, is a collection of essays by different authors, followed by an "encyclopedia" of recommended plants. The articles are quite good. In particular, C. Colston Burrell (*Spring-Bulb Design Primer*), discusses contrasting shapes and blending colors, as well as the use of shrubs, perennials and annuals. Not only does he present a fair number of planting schemes but his ideas are presented in such a way as to spark many more. Very good for those of us who buy a bulb because we like the color, then end up planting it just where it is most likely to clash with the original inhabitants.

Also good is the article on containers as an extension of the garden. This is not forcing, but designing small "beds", complete with a succession of bloom, that can be used as focal points or to bring flowers to a place (concrete steps, for instance) where they would not otherwise be able to grow.

Unfortunately, the encyclopedia portion doesn't always live up to the promise of the essays. Some of the hardiness recommendations make bulb catalogs seem positively cautious and invasiveness is often ignored and occasionally referred to as "will naturalize". Of the 50 selected genera, there are both delightfully unusual selections (*Tecophilaea*

and *Hermodactylus*) and rather odd ones (*Anemonella*, *Cardamine* and *Dodecatheon*).

The photographs, both closeups and distance views, are excellent. They do a fine job of illustrating the writers' comments and are generally well captioned.

Growing Bulbs Indoors P.J.M. Knippels, A. A. Balkema 1999 ISBN 90 5410 467 8
\$29.00 US.

This book is a gem. Mr Knippels likes to grow the more unusual bulbs, and has had little success in finding cultural information pertinent to European windowsill cultivation. This book is full of his hard won experience growing bulbs native to South Africa and South America, mainly Chile. No tulips, no crocus, just lots of southern hemisphere geophytes of the sort that northern gardeners occasionally acquire and usually kill.

After chapters on cultivation (including winter and summer storage) and pests, the book is an A-Z list of genera with introductory notes on several species. followed by the cultural information in chart form. Mr. Knippels has devised a system which is easily learned and provides immediate gratification, something gardeners just aren't used to. The chart, arranged by months, tells at a glance whether the plant should be dormant, in leaf or in flower; how much water, if any, it should be receiving; how deep it should be planted; whether it flowers with or without leaves, and how difficult it is to grow. Wow!

The bibliography is packed with references; the glossary is short and to the point; and there are lists of genera by cultivation difficulty as well as by ornamental value. The photos, though few, are generally good. This book's only fault is that it's not long enough. I can only hope that, as more and more southern hemisphere bulbs become available to northern gardeners, Mr Knippels will keep growing and write a second edition!

Lisa Flaum lives outside of Waterloo, IL, with her husband, children, dogs, cats, and assorted plant-eating wildlife. Present enthusiasms include Crocus, Allium, Crinum and Zephyranthes, as well as many perennials. A 3 acre garden provides lots of room to experiment.

Smoke Treatment, and Germination of Australian Natives

Dirk Wallace

Yackandandah, Victoria, Australia

In fire-prone floras, particularly those of Mediterranean climate zones, fire has been shown to be crucial for the germination of seed from a wide variety of taxa. Habitat burning is an important cue, for fire-sensitive species, in triggering germination. For many of these taxa, germination under controlled conditions has been difficult (to near impossible!) using conventional treatments, other than excised embryo culture or special pre-treatments including hormonal applications.

Following the discovery that smoke stimulated germination of the rare South African plant *Audouinia capita*, much research into this phenomenon has been carried out around the world for the conservation of such rare species, and for the many uses in land management and nursery production.

Research by Dixon et al. (1995) has shown that smoke is a key principle in breaking seed dormancy in a wide variety of native Australian species. Though this study has concentrated on Western Australian plants, general principles have emerged regarding the benefits of smoke for germination:

- Smoke can promote earlier and more uniform germination under controlled greenhouse and laboratory conditions.
- Smoke enables germination in species previously thought difficult or impossible to germinate by conventional means.
- Smoke substantially promotes germination in species with otherwise low levels of germination.
- The promotive effect of smoke is independent of seed size and shape and plant life form, i.e. whether annual, perennial, herbaceous, seeder (fire sensitive) or resprouter (fire tolerant).
- Aerosol smoke, smoke dissolved in water and solids (activated clays, sand particles) that have been smoked have all been effective in promoting seed germination.
- High doses of smoked water can inhibit

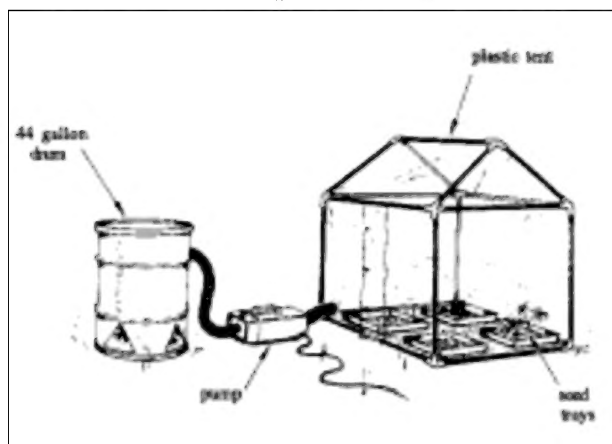
germination of many species. All the experiments tend towards low doses of smoked water followed by normal watering, as per standard seed raising methods.

- Germination over time in response to smoke varies amongst taxa.
 - a. Control (unsmoked) and smoked seed attained final germination at the same rate, eg. *Conostylis* species.
 - b. First seedling emergence occurred earlier in smoked seeds.
 - c. Control germination was limited to the first week or so whereas smoked seed continued to germinate over a longer period.
 - d. Difference between control and smoked treatment became apparent only after several weeks.
- Seed that does not respond to smoke treatment includes that of species in *Persoonia* and drupaceous Epacridaceae (those species with large, woody fruits, compared to small-seeded species which do respond positively to smoke). These groups have been extensively investigated to determine possible barriers to smoke entering the seed but all attempts to scarify the seed mechanically or with acid have not been effective in improving germination, *Persoonia* has been found in other studies to respond to gibberellic acid treatments, suggesting that factors involved in seed dormancy in this species may require other dormancy-breaking mechanisms for germination to proceed.

Methods of Applying Smoke

Sown seed trays or whole seed are placed on an open-mesh, two-tiered frame in a sealed plastic tent approximately 2m x 2m and 1.4m high. Smoke is generated by slow, controlled combustion, in a 200 litre drum, of a mixture of fresh and dry leaf and twig material from a range of plants. Prunings of native species are usually used so as to emulate the natural smokes likely to occur after a wildfire

in bushland habitats. *Melaleuca* has been found to readily produce smoke. The drum is fitted with an inlet through which air is pumped at the rate of 60-100 litres per minute, and an outlet is connected to a 1.5 metre long pipe. A 2 metre length of flexible, stainless steel exhaust piping approximately 50 mm in diameter is then connected to the plastic enclosure. This ensures that the smoke is injected towards the roof of the tent and is therefore spread throughout the tent.



Treating seeds with smoke.

After smoking for 60 minutes, trays are transferred to the glasshouse and watered carefully for the first 6-10 days to ensure that the soluble promoter in smoke comes in contact with the seeds, but is not washed through the mix before reacting with the seed. Watering is then continued as for normal germination.

Seeds can also be direct-smoked. In this instance, seed is laid out in a single layer in trays. The trays are smoked for 60 minutes in the fumigation tent (as described above) and the air-dried seed is then sown or stored dry until required. Unlike smoke applied to soil containing sown seeds, smoked seeds can be watered, as would be normal practice.

Smoked Water

Smoked water can be useful for direct priming or pre-germination of seeds prior to sowing. Application of smoke via water has the advantage of not requiring the use of the smoke tent and the convenience of priming seeds at will. Smoked water primed seeds may germinate better than those in smoked seedling trays. This process allows the handling of large quantities of seed such as is required for land restoration or automated seed-sowing devices.

Smoked water is produced by drawing smoke produced from the combustion drum operating as

for aerosol smoke, through a 20 litre container of water. Smoke bubbling is done for approximately 60 minutes and the resultant solution is frozen until required.

Seed is soaked for 12 hours in a 10%, 9:1 water: smoke-water solution. The seed is then sown, or dried for sowing as required. Seeds treated with smoked water can be watered normally after smoking. Although this method has been shown to be useful for a number of native species, caution is recommended, as seed of some species can degenerate if soaked in water for prolonged periods. Also, pre-germination as a horticultural practise for seed of Australian native plants requires some experimentation to ensure that the process is applicable. In some cases, pre-germination can lead to a decline in seed quality and viability. It is therefore recommended that species to be treated in this way should be tested for tolerance to imbibing and drying treatments. (With seeds that are prone to degeneration during soaking, it is useful to bubble air – as from a fish tank aerator – through the water during soaking).

Habitat Germination Studies

Smoke-fumigation treatments can be applied directly to habitat sites. For a range of species, germination will happen in 6 to 8 weeks after treatment.

Smoke is generated as above and applied to sites where excess leaf litter and larger plants have been removed to prevent 'shadowing' of the soil from smoke. Tents of 5 m x 1 m x 40 cm high are erected over the sites and smoke is pumped in for 60 minutes. Best results are achieved if smoking is done in summer to early autumn so that wash-down of the smoke factor coincides with the onset of the first rains (for temperate regions of Australia). Smoking undertaken at other times of the year appears to yield less germination for taxa that respond to summer/autumn smoking.

Further Reading

Dixon K.W, Roche S and Pate J.S (1995). *The promotive effect of smoke derived from burnt native vegetation on seed germination of Western Australian plants*. *Oecologia* 101: 185-192

Acknowledgments

This article is derived from information by Dr. Kingsley Dixon and Shauna Roche.

Dr Kingsley Dixon is Assistant Director and Shauna Roche is a research botanist at Kings Park and Botanic Garden, West Perth, Western Australia.

Appendix

Germinating Australian Native Geophytes with Smoke

Anigozanthos (Haemodoraceae) – Some species are easy to grow from seed, and others will germinate erratically. Smoke treatment will improve results of some species, including *A. humilis* & *A. manglesii*.

Blancoa (Haemodoraceae) Propagation from seed is usually difficult and unreliable. Smoke treatment may be successful with some species.

Burchardia (Liliaceae) – Smoke treatment enhances germination. Western Australian species give very low germination without smoke treatment.

Conostylis (Haemodoraceae) – Smoke treatment has been successful with some species (e.g. *C. neocymosa* & *C. setosa*) and may have potential with other species.

Dianella (Liliaceae) – Germination results can be erratic for some species, especially *D. revoluta*. Smoke treatment significantly increased results for *D. revoluta* and may enhance results of other species.

Patersonia (Iridaceae) – Most species have low viability, especially West Australian species. Smoke treatment significantly improves results for all species.

Thysanotus (Liliaceae) – Some species are difficult to grow from seed and have poor results. Smoke treatment improved germination for *T. multiflorus* and may be successful with other species.

Tricoryne (Liliaceae) – Very difficult to grow from seed. The seed appear to have high viability, yet poor germination usually results. Smoke treatment may be worth trying!

References:

Ralph, Murray (1997) – “*Growing Australian Native Plants from Seed*”

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